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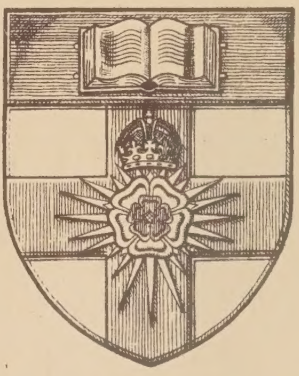

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REPORTS

FROM

COMMITTEES:

TWELVE VOLUMES.

—(12.)—

SMALL ARMS;

THAMES MARSHES.

Session

31 *January* — 12 *August* 1854.

VOL. XVIII.

1854.

REPORTS FROM COMMITTEES:

1854.

TWELVE VOLUMES:—CONTENTS OF THE

TWELFTH VOLUME.

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REPORT

FROM THE

SELECT COMMITTEE

ON

SMALL ARMS;

TOGETHER WITH THE

PROCEEDINGS OF THE COMMITTEE,

MINUTES OF EVIDENCE,

AND

APPENDIX.

Ordered, by The House of Commons, *to be Printed,*
12 *May* 1854.

Mercurii, 1° *die Martii*, 1854.

Ordered, That a Select Committee be appointed to consider the cheapest, most expeditious, and most efficient mode of providing Small Arms for Her Majesty's Service.

Jovis, 2° *die Martii*, 1854.

Committee nominated of,—

Mr. Walpole.	Colonel Dunne.
Colonel Maule.	Mr. George Dundas.
Mr. Muntz.	Mr. Peach.
Colonel Boldero.	Viscount Jocelyn.
Mr. Newdegate.	Colonel Lindsay.
Mr. Monsell.	The Judge Advocate.
Lord Paget.	

Ordered, That the Committee have power to send for Persons, Papers, and Records.

Ordered, That Five be the Quorum of the Committee.

Veneris, 3° *die Martii*, 1854.

Ordered, That Sir William Molesworth and Lord Seymour be added to the Committee.

Veneris, 12° *die Maii*, 1854.

Ordered, That the Committee have power to Report their Observations, together with the Minutes of Evidence taken before them, to the House.

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REPORT.

THE SELECT COMMITTEE appointed to consider the Cheapest, most Expeditious, and most Efficient Mode of providing SMALL ARMS for HER MAJESTY'S SERVICE; and who were empowered to Report their Observations, and the Minutes of Evidence taken before them to The House;——HAVE considered the Matters to them referred, and have agreed to the following REPORT:

IN the first place, Your Committee directed their inquiries to the complaints of the Board of Ordnance, in regard to the difficulty of procuring muskets; next, they obtained all the information which they could collect as to the plan of a large Government factory for the production of muskets; and lastly, they heard from the contractors, and from other persons connected with the gun trade, the statements and suggestions which they had to offer in reference to the present system, and to the best mode of securing a cheap, expeditious, and efficient supply of small arms hereafter.

The existing system has been fully described by Sir T. Hastings, who is a member of the Board of Ordnance, controller of stores, and principal storekeeper. 5.

He states that all the materials, the component parts of the musket, are in the first instance procured by open contract, and after inspection and approval, placed in the Ordnance Stores. There is a separate contract for each of the separate parts; each is subjected to a strict view or examination by viewers specially appointed for the purpose; accuracy of shape and size is secured by a system of gauges, while other tests are employed to ascertain the strength of the work and the soundness of the material. 20. 3848.

Any contractor who is dissatisfied with the decision of a viewer can appeal to the inspector of small arms, and can furthermore bring his complaint, if he shall think fit, under the consideration of the Master-general and Board.

A portion of the materials so received into store is issued to the Government establishment at Enfield, to be there set up; that is, fitted together and finished into complete muskets. The chief part of the materials is, however, delivered to contractors who contract for the setting-up, and return the arm to the Board of Ordnance finished. In this state it is again subjected to a view.

Lord Raglan, the Master-general, stated that he was charged with the responsibility of providing a sufficient supply of Small Arms for the defence of the country, and that he was not satisfied with the present mode in which that supply is obtained. He added, that his objection did not apply to the details of the system only, but that he considered it unsafe for the country to go on without substituting for it arrangements by which the supply of Small Arms should be independent of contractors. His opinion in regard to the proposed Government factory, was founded on the information given to him by Mr. Anderson, and the report of a committee of officers assembled to consider this matter. 1897. 418. 443.

Sir T. Hastings gave evidence to the same effect. He referred to the experience of the last three years as a convincing proof of the impossibility of obtaining a sufficient supply of muskets under the present system.

270. In May 1851 the Board of Ordnance took steps to procure 28,000 rifled muskets. The contracts were entered into in February 1852, and the muskets were not delivered until November 1853.

Again, in April 1853, contracts were entered into for 2,000 artillery carbines, and of these 500 only have been as yet delivered.

So again, in August 1852, a rifled musket of a new pattern was decided upon; 20,000 barrels were ordered, but the offers to contract were so unsatisfactory that they had again to be advertised for. The only tenders, however, were from
284. the same parties, and so great has been the delay that the Board have only been able to enter into a contract for setting-up, to be completed in September 1854.

301 Sir T. Hastings read many letters from the contractors assigning various
See Appendix. reasons for these delays. Combinations and strikes amongst the workmen, difficulty in procuring coal, illness of a skilled artisan, accident to machinery were adduced as causes of delay, and excuses for failure in the fulfilment of the contracts.

11. Sir T. Hastings informed Your Committee that a large supply of muskets of the new pattern were now required to be provided as speedily as possible, namely:

For the Line	150,000
the Artillery	14,000
the Militia	100,000 at least.
Pensioners	16,000
Coast Guard	14,000
Marines	12,000
Navy	30,000
Channel Islands Militia	6,000
Colonial Corps	5,000
	347,000

In addition to this number the highest military authorities considered that there should be in store for the home service 450,000 stand of arms; whilst the number required in the Colonies amounted to 150,000 more. The total number
15. would therefore be upwards of 900,000. When this number had been provided, a supply of 30,000 muskets in each year would, it was believed, suffice to replace those worn out in the service. The musket is considered condemnable at the end of 12 years.

For the speedy and economical supply of this large amount of muskets the Board of Ordnance propose to take the whole manufacture into their own hands, and they accordingly directed plans to be prepared for an establishment capable of producing 500 muskets a day.

348. The details of the plan will be found in Mr. Anderson's Evidence.

Your Committee endeavoured to ascertain the grounds upon which the Board of Ordnance had arrived at this conclusion.

Lord Raglan and Sir T. Hastings stated that they had been guided in their
184. opinion partly by the report of the Commissioners who, during last year,
251. visited the manufactories of the United States, and partly from communications with Mr. Anderson and other persons conversant with machinery.

The advantages of producing muskets by machinery are said to be, cheapness in the manufacture, an exact similarity in the several parts, so that they may be readily interchanged and replaced, and above all, the facility of rapidly producing muskets, and of increasing or reducing the supply according to the requirements of the time.

Sir T. Hastings believes that these advantages are now secured to the United States by the system there adopted, for they possess, he says, two factories,
181. each capable of producing 30,000 muskets a year. He also referred Your
184. Committee to the establishment of Colonel Colt.

Mr. Anderson, the chief engineer in the Royal Arsenal at Woolwich, informed Your Committee that he had directed his attention during some months to the manufacture of muskets by machinery, and although he considers that there is as yet little machinery in England specially adapted to this purpose, yet there is abundance of talent to produce such machinery if required. Mr. Anderson admits that he is not practically acquainted with the manufacture of muskets, but as a mechanician he thinks that many parts of the rifled musket now adopted might be much improved; a roller lock, for instance, might be substituted for the swivel lock lately introduced; the cock might be more conveniently shaped, with the view to its construction by machinery; the heel-plate might be simplified in its form, and other parts of the musket might be modified without interfering with the efficiency of the arm. 342. 363. 771. 362.

Mr. Anderson also thinks that a more definite system of producing and boring barrels might be devised, and he hopes that an improvement may be introduced in the forging process of the bayonet; but in reference to these matters, Mr. Anderson admits, that to originate a set of machines to do these works is not an easy task, and therefore he considers it desirable to obtain from America such machines as they possess applicable to the manufacture of muskets, and he would further wish to go to America in order to study their system on the spot before commencing operations here. 893. 900. 352. 809. 892. 1062.

The attention of Your Committee having been directed to the American musket, they were desirous of seeing one of the muskets which had been made by machinery, in order that they might compare it with the workmanship of the rifle musket approved here by the highest military authorities. The Board of Ordnance could not comply with this request, and admitted that they had never themselves seen the musket to which they referred. 251. 1915. 1825.

Your Committee examined Mr. Whitworth, the eminent engineer and manufacturer of machinery, who had been during last year commissioned by the Government to visit the manufactories of the United States, and whose Report has been lately presented to Parliament.

Mr. Whitworth said that he had not been specially directed to inspect the manufactories of fire-arms, and had not therefore given the close attention to the subject which he would have done if he had foreseen the present inquiry. 2167 2177.

Mr. Whitworth's evidence shows that at Springfield, the Government establishment of the United States, there is an ingenious system of machinery for the manufacture of gun-stocks. A gun-stock was completed in his presence within the space of 23 minutes, and this operation was performed entirely by machinery, with the exception of some polishing with sand-paper, a labour which was performed by hand, but which did not occupy more time than two minutes. Mr. Whitworth does not suppose that they could work at this rate constantly, but thinks it would be safe to take double as the average time for completing a gun-stock. As regards working in iron, Mr. Whitworth did not consider the Americans equal to the manufacturers of this country. He did not examine a musket in America minutely. It was his opinion, that with regard to an American musket, taking a number of the different parts of it, there is greater identity than there is in the rifles manufactured in this country, because there is so much more attention paid to the machinery, and also to the persons attending that machinery; but he thought that the parts of one individual musket are not so good in America as the rifle which he had seen here. 1969. 2137. 2036. 2043. 2178. 2015.

Mr. Whitworth said that he would not recommend the establishment in this country of a Government factory on a scale equal to producing 500 muskets a day, but he would recommend the Government to have an establishment as perfect as could be made, to produce a limited number, and to set an example to other gun-makers. 2082.

With reference to cheapness, Mr. Whitworth had not ascertained the price of a musket in America, nor of a musket made by machinery; but he is of opinion that some of the results to be produced by machinery would be at a much less rate and much better than by hand labour. 2170.

He did not believe that the several parts of different muskets made by machinery would interchange; they might be adapted, but they would fit badly. 2093.

2207. 2154. badly. Wherever great perfection of finish and nicety of adjustment are required, recourse must be had to hand labour.

1691. 1739. Mr. Wallis, the head master of the Government School of Art at Birmingham, had also visited the United States as a Commissioner. He said that the fit of the other parts of the musket made at Springfield, into the stock, were, in his opinion, perfect, as he saw the lock, the barrel, and the furniture put into a gun stock, each part being fetched indiscriminately from a heap, and he saw no choice made in the portion to be fitted; but he has no practical acquaintance with the manufacture of fire-arms; and his knowledge of machinery had been acquired from residence in manufacturing towns, and not from any superintendence of a factory or business necessarily connected with machinery.

1076. 617. 1135. Your Committee also examined Colonel Colt, and several members of the Committee visited his establishment, to which their attention had been specially directed. From his evidence, it appears that the Government of the United States do not provide their muskets solely by a Government factory, but obtain a large portion by contract from private manufacturers.

1160. 1191. 1185. 667. As regards the cheapness which may be expected to result from an increased employment of machinery in the production of rifled muskets, Colonel Colt said that many parts of the new musket would necessitate the employment of complicated and expensive machin s; he thought the arm might be in some respects simplified, and the cost of its production thereby reduced, without detracting from its efficiency. The price of the musket must depend in great measure upon the quantity to be produced according to a given pattern. If the Government were to advance 100,000 *l.* for machinery, the manufacture must be at first slow and the musket more costly. Colonel Colt would not like to deliver any in the first year, but in the course of 10 years he thought he should be able to produce a million muskets, at a price not exceeding 30 *s.* each. If only a smaller number were required, the cost of the musket would be increased.

1247. 1150. 1220. 1053.

1357. 1. 1372. 1395. 1541 1404. 1450. 1500. 1432. Mr. Nasmyth, the well-known inventor of the steam-hammer, considers the systematic introduction of machinery into the gun trade to be feasible and highly desirable. About four years ago he supplied the Russian Government with some machinery for producing parts of a musket; he believes that if proper steps were taken, a factory might be established for 150,000 *l.*, which would be ready to commence working in 18 months from the present time. He considers that in the gun trade, the masters are in a state of dependence upon the skilled workmen, from which they can only be emancipated by the substitution of machinery for hand labour. Mr. Nasmyth had however not seen a musket produced entirely by machinery.

Your Committee entered into much detail respecting the parts of a musket to which it was stated that machinery or labour-saving machines might be extensively applied.

Gun-Stocks.

2207. 4553. 5496. 5765. 2029. 7687. 6006. 7470. The evidence seems to justify a belief that though the application of machinery to the formation of gun-stocks has been tried without success in this country and in Belgium, yet a better system has been employed in the United States, which deserves to be introduced as an experiment. It is said that the walnut used in this country is harder and less suited to the work of machines; but this can only be ascertained by trial, and a difficulty of this nature, if it should exist, may probably admit of a remedy. The gun-stock costs in a rough state 3 *s.*, and in its finished state 10 *s.* to 12 *s.*

Barrels.

3286. 5781. 7716. 1463. 360. 3113. 893. 3309. 2060. 6187. In the manufacture of gun-barrels there are, it is said, four or five distinct trades; in some of which machinery is chiefly employed, in others hand-labour is still used. The rolling is performed by machinery. The boring might, it is thought, be improved, but machines have not yet been adapted to effect the object desired. The accuracy of the bore is tested by the eye, and no mechanical contrivance has been invented which supersedes this mode of ascertaining the correctness of the work.

Machinery for rifling barrels has been used in this country and on the Continent. A machine invented in France, which is used in the Government establishment of Belgium, one of which has lately been introduced in this country, is said to possess many advantages over the machines generally used for this purpose. 7104. 7142.

The present contract price of the barrel is 13*s*. The peculiar construction is said to have occasioned this price, but an alteration has been approved, which has already reduced the price to 11*s*. 6*d*.; and it is stated that if a large number are required, the price can be further reduced to 10*s*. 6*d*. 152. 3266. 3270. 3411.

Gun-Locks.

It appears that machines have always been used in the manufacture of gun-locks, and if a large number of a similar pattern were required, the employment of machines might be advantageously increased. Whether any great economy will be attained by the use of more machinery in the manufacture of locks can only be tested by experiment. The present lock is said to be very good. The contract price is stated to be 8*s*. 6*d*. It has been suggested that this price could be reduced without diminishing the efficiency of the lock. 5500. 2150. 4048. 4058. 84. 4894. 6579. 3693. 145. 4800.

Bayonets.

Mr. Anderson proposes to apply machinery to the manufacture of bayonets, and expects a great reduction in the cost of bayonets so made. The approved pattern bayonet requires, both as to its form and its finish, an amount of labour which has greatly increased its price. 964.

The contract price of the last approved bayonet is 7*s*. 6*d*. The bayonet formerly in use, which was very inferior, cost 2*s*. 10*d*. or 2*s*. 6*d*. Sir T. Hastings believes that with machinery the bayonet which costs 7*s*. 6*d*. could be made for 1*s*. 6*d*. The manufacturers regard this expectation as illusory, but admit that an improved application of machinery, with a slight alteration of the form of the bayonet, might effect a considerable reduction in price. 154. 3765. 3795. 3897. 2868. 7689.

The result of the evidence as to the advantage of a more extensive application of machinery in the gun-trade appears to be, that wherever a large number of articles, exactly similar in pattern, are required, opportunities are afforded for the application of machinery. The expediency of introducing it must however depend on other considerations, which can only be satisfactorily settled by experience. There is, however, reason to believe, that if the gun-trade could have confidence that a large supply of muskets would be purchased by the Ordnance in future years, the manufacturers themselves would be anxious to introduce machinery wherever it could be profitably employed. 6579. 5799. 3245.

The two questions,—namely, the advantage of an increased use of machinery and the expediency of making all muskets in a Government factory, are not, therefore, in any way necessarily connected.

Efficiency of the Musket.

It is admitted that the rifled muskets, whether made at Enfield, or procured by contract, are very efficient. The arm has been tried in service during the Caffre war, and from the evidence of Major Bruce, it seems to have answered every expectation; "it was a most efficient arm, not surpassed by the most costly sporting rifles which could be sent from this country." 2399. 2402.

The rifle pattern adopted in 1853 is still further improved; it is admitted by all the witnesses to be a very excellent and highly finished arm. 675.

There are, however, some points of detail which, it is said, are susceptible of improvement; and it has been suggested by witnesses well acquainted with the details of the manufacture, that a saving might be made in each musket without diminution of the efficiency of the arm. 6606. 7790. 7861. 7876.

Expense of the Musket.

4818. 7913. Mr. Gunner stated, that considering the work and high finish of the arm, he did not regard the price as excessive.

The price of the last approved pattern is 3 *l.* 9 *s.*, by contract. It is said to be made at Enfield for 3 *l.* 4 *s.*

1134. 2172. 4414. The present contract price of the musket in the United States is said to be 10 or 12 dollars, from 2 *l.* to 2 *l.* 10 *s.* This musket has a smooth barrel. Further information upon this subject from the Government of the United States will be found in the Appendix.

The price at which the Belgian rifled musket is made in the Government factory is said to be 42 francs.

4717. 5912. 4687. A musket of the Belgian pattern could, it is said, be made in this country, at the price of 36 *s.* or 37 *s.* each. This arm, although, perhaps, as effective for practical purposes, is not so highly finished in its details as the musket adopted by the Ordnance. The lock would be rejected by the Ordnance viewers, and the bayonet is far less expensively finished.

5811. With reference to the high price of the approved musket, the evidence of the practical gun-makers shows that the high degree of its finish not only adds to the cost, but also impedes the rapidity of the supply.

Supply of the Musket.

With regard to the most expeditious mode of procuring a supply, Your Committee have obtained much evidence.

6426. Colonel Bonner, who has for 20 years superintended the supply of muskets for the East India Company, stated that the Company have a regular army exceeding 200,000 men; that their muskets had always been purchased in this country by contract; that their requirements had fluctuated greatly in successive years, varying from 12,000 in one year to 58,000 in another. Yet, he said, the East India Company had never found difficulty in procuring a supply, nor had 6423. 6569. they ever found that the contractors took advantage of an emergency to raise their price.

Colonel Bonner described to Your Committee the system under which Small Arms are procured by the East India Company. They have a list of contractors for setting up and making the materials of muskets. The smaller articles, such as screws, nails, and swivels, together with the stocks, are provided by the setters up. Each of the other parts of the musket is got directly from the persons whose trade is to manufacture it. When a supply of muskets is required by the Company, Colonel Bonner ascertains the Ordnance prices, and calls together the setters-up and material makers. He shows them the pattern 6495. gun, and discusses with them the price. The price is then fixed by discussion and arrangement, and not by competition.

Colonel Bonner, however, said, that he had had no experience as to the supply of new rifle muskets, as none had been yet ordered by the East India Company, who have purchased only 5,000 muskets during the last three years.

3715. 3698. 3480. The general gun trade of this country is said to be increasing. Merchants and gun-makers have affirmed that they export more extensively than formerly finished guns and parts of guns, locks especially, and that even in the United 3592. States, where machinery is stated to be so advantageously employed in the gun manufacture, the general gun trade, nevertheless, derive their materials from this country.

It is to be observed, that the increase has been in the inferior class of arms, or else in guns far superior to those usually employed for warlike purposes.

6722. It appears, therefore, from the evidence taken by Your Committee, that the manufacturers of this country have supplied the East India Company with all the classes of small arms which they have hitherto required. They have also, during

during many years, supplied foreign Governments, and it is said, that they can successfully compete with manufacturers in foreign countries. But it also appears, that they have not succeeded in satisfactorily supplying the Board of Ordnance with the quantity of the superior class of arms required in the last three years for the use of the British army.

Your Committee endeavoured to ascertain the real causes of this difficulty.

The impediments to this supply, as stated by the contractors and other witnesses, may be classed under the following heads:

1st. Strictness of view, or severity of inspection.

This cause of delay is particularly mentioned with reference to the contracts of 1851, it being admitted that, since the appointment of the new inspector, the system of view has not been such as to occasion any complaint. 3184. 5930.

It is stated that in the inspection of the different parts of a musket, although gauges and mechanical appliances are used, much latitude must still be left to the discretion of the viewer. If regulations are strictly enforced, and minute accuracy be insisted upon, far greater skill will be necessary in the workman, and the price of the work must be enhanced in proportion. When a man finds his work rejected, and incurs a serious loss for some deviation so slight, that, for all practical purposes, it is immaterial, he will naturally hesitate to continue in a business where his week's earnings depend on such doubtful, and, it may be, capricious decisions. Unless there is a ready appeal to some superior viewer or inspector, the workman feels that he has no redress, and he may even fear to complain, since his complaint may occasion future ill will towards himself. 5675. 6368. 7323. 5923.

When, again, contractors find their work rejected, they should not, it is said, be obliged to appeal to the Master-general and Board of Ordnance, whose members may not be practically conversant with such details; but if, in important cases, competent persons could be named by the Ordnance who could review the matter conjointly with the inspector, it is said that the contractors would feel more confidence in such decisions, and inferior workmanship would be equally excluded. 4061. 4137.

This subject appears to be well deserving the consideration of the Ordnance. A strict view should, in the opinion of Your Committee, still be maintained, but the conduct of the view at present is not complained of. 7649.

It is also stated, that on some occasions there has been considerable delay before viewing the articles after they have been sent in.

2d. Another source of delay is said to have been occasioned by difficulty in procuring, and even in seeing, the pattern of the article to be manufactured. 4121.

It is stated, that although there may be many contractors for the same article, only one pattern of that article is sent; so that, while it may be retained by one contractor, the others are necessarily delayed. In other cases, after the contract has been entered into, a considerable interval has elapsed before the pattern has been furnished; and instances are adduced where, after a pattern has been sent, alterations have been adopted, and the articles made according to the original pattern refused. 4874. 5258. 3771.

Your Committee have observed that the East India Company, as well as the Board of Ordnance, provide only one pattern of the articles for which they contract; but there seems no reason why a larger number should not be provided if by this means the operations of the contractors could be saved from needless delay.

3d. Another source of delay is said to arise from subdivision of contracts. Some witnesses have recommended that a contract should be entered into for the musket complete, in lieu of the present numerous contracts for the separate parts. This course is recommended by Mr. Whitworth; he says that the present mode of contracting is absurd, considering the extent of the gun trade in this country. 7613. 7644. 2138. 1411. 2140. 1626.

All the witnesses who are connected with the gun trade concur in recommending that in regard to the smaller articles, 14 or more in number, which 6206.

6623. 6404. are now supplied to the setters-up from the Government store, the system should be altered, and the setters-up should in future be required to procure them. This is the practice of the East India Company.

Your Committee have now pointed out the chief causes of delay which have been adduced by the contractors. A reference to the Appendix, and page 2 of this Report, will show that the letters of contractors alleged many other causes, such as combinations, strikes of workmen, &c.

Your Committee have heard all that could be urged in favour of a Government manufactory for muskets, but they have not received evidence sufficient to satisfy them that a Government factory would afford the cheapest, most expeditious, and most efficient mode of providing muskets.

Your Committee recommend that the system of contracting for the supply of Small Arms should not be discontinued without further proof that a sufficient supply cannot be obtained under it.

In recommending that a system of contracting for the supply of muskets should be continued, Your Committee would suggest that consideration should be given to the details above referred to.

7696. 5925. 7335. With a view of expediting supplies, and giving confidence to the trade, Your Committee recommend that contracts should only be entered into with such men as have means and capital to fulfil their engagements; that in future the contract should be understood to commence from the time of the delivery of the pattern; and that in all cases of doubt on the part of the viewer, or remonstrance on the part of the contractor, a ready appeal to a competent person should be afforded.

Your Committee would here observe, that the complaint of the contractors, that the orders of the Government for Small Arms have not been continuous, raises a question of great importance. There is no doubt that a large demand for Small Arms, spread over a number of years, would attract to the gun trade a supply of hands sufficient to meet the demand. Even in the first year considerable additional supplies might by this means be attained, and in each successive year the increase would be augmented. On the other hand, it has been observed that it would not be judicious on the part of the Board of Ordnance to pledge themselves to large and continuous orders, for in this age of rapid invention, such a course might be attended with very inconvenient consequences. For instance, the pattern of 1853 has been substituted for that of 1851; therefore, if large orders for the pattern of 1851 existed, they would be orders for a now obsolete arm. Some new pattern may soon supply the place of that which is now ordered. The contractors, however, state that the continuous employment which they desire need not depend upon the identity of the pattern.

While Your Committee recommend the system of contracting for the supply of Small Arms should not be discontinued, they are, nevertheless, of opinion that a manufactory of Small Arms under the Board of Ordnance should be tried to a limited extent. This manufactory would serve as an experiment of the advantages to be derived from the more extensive application of machinery, as a check upon the price of contractors, and as a resource in times of emergency, and it should be arranged with a view to its economical working.

Your Committee recommend that this trial should be made on a limited scale, inasmuch as they believe that if the Board of Ordnance were to construct a factory on the extensive plan originally proposed to Parliament, the 7826. manufacturers would foresee that their employment as contractors must soon cease. The public service might thus lose the advantage of the skill, capital, and enterprise of private traders at a time when their assistance is needed, and the further experiment of providing arms by contract would not, in the opinion of Your Committee, be fairly tried.

Your Committee, therefore, recommend that the Government manufactory at Enfield should be continued, since it appears to them, not only from the evidence, but from information afforded by several Members of the Committee, who have inspected the Enfield establishment, that it is well adapted, and can be made available for the execution of the plan which Your Committee have recommended,

recommended, and that it is capable of any extension that can be required at far less cost, and with much less delay than would be inevitable in the construction of a new establishment.

In order that Parliament may have the means of ascertaining (in an economical point of view), the success of the Government factory for the construction of muskets, Your Committee recommend that a debtor and creditor account should be kept of this separate establishment, so that the whole profit or loss may be fairly shown.

After concluding this Report, returns from the Government of the United States were submitted to Your Committee, but they have not been able to examine them. These returns will be found in the Appendix.

12 *May* 1854.

PROCEEDINGS OF THE COMMITTEE

Jovis, 9° *die Martii*, 1854.

MEMBERS PRESENT:

Colonel Dunne.	Colonel Maule.
Lord Seymour.	Mr. Geach.
Sir William Molesworth.	Mr. Newdegate.
Colonel Boldero.	Colonel Lindsay.
Mr. Monsell.	Mr. Muntz.

Sir WILLIAM MOLESWORTH is called to the Chair.

The Committee deliberated as to their course of proceedings.

[Adjourned till To-morrow, at One o'clock.

Jovis, 10° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Colonel Maule.	Colonel Lindsay.
Mr. Monsell.	Colonel Dunne.
Mr. Geach.	Lord Seymour
Mr. Muntz.	Mr. Walpole.
Colonel Boldero.	Mr. Newdegate.
Lord Paget.	Mr. George Dundas.

Captain Sir *Thomas Hastings*, R. N., examined.

[Adjourned until Monday, at One o'clock.

Lunæ, 13° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Monsell.	Lord Paget.
Colonel Maule.	Mr. George Dundas.
Mr. Muntz.	Mr. Walpole.
Lord Seymour.	Colonel Dunne.
Mr. Newdegate.	Mr. Geach.
Colonel Boldero.	Colonel Lindsay.

Captain Sir *Thomas Hastings*, R. N., further examined.

Mr. *John Anderson*, examined.

[Adjourned till To-morrow, at One o'clock.

Martis, 14° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Monsell.	Colonel Dunne.
Colonel Boldero.	Lord Paget.
Mr. Geach.	Mr. Newdegate.
Mr. Muntz.	Mr. Walpole.
Mr. George Dundas.	Colonel Lindsay.
Lord Seymour.	

Colonel *Tulloh*, examined.

Captain Sir *Thomas Hastings*, R. N., further examined.

[Adjourned till To-morrow, at One o'clock.

Mercurii, 15° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Monsell.	Lord Seymour.
Colonel Boldero.	Lord Paget.
Mr. Newdegate.	Colonel Lindsay.
Mr. Geach.	Colonel Maule.
Mr. Muntz.	Mr. George Dundas.
Mr. Walpole.	

Mr. *John Anderson*, further examined.

[Adjourned till To-morrow, at One o'clock.

Jovis, 16° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Monsell.	Colonel Dunne.
Colonel Maule.	Lord Paget.
Colonel Boldero.	Colonel Lindsay.
Mr. Newdegate.	Lord Seymour.
Mr. Geach.	Mr. George Dundas.
Mr. Muntz.	Mr. Walpole.

Lieutenant-colonel *Colt*, examined.

Captain Sir Thomas *Hastings*, R. N., further examined.

[Adjourned till To-morrow, at One o'clock.

Veneris, 17° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Monsell.	Lord Seymour.
Colonel Boldero.	Colonel Dunne.
Mr. Newdegate.	Colonel Lindsay.
Mr. Geach.	Mr. George Dundas.
Mr. Muntz.	Mr. Walpole.
Lord Paget.	

Mr. *James Nasmyth*, Mr. *George Wallis*, Colonel *Archibald Chalmer*, R. A., were severally examined.

[Adjourned until Monday next, at One o'clock.

Lunæ, 20° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Colonel Boldero.	Lord Seymour.
Mr. Monsell.	Mr. George Dundas.
Mr. Muntz.	Mr. Walpole.
Colonel Dunne.	Mr. Geach.
Lord Paget.	Mr. Muntz.
Colonel Lindsay.	Mr. Newdegate.

The Right Honourable General Lord *Raglan*, Mr. *J. Whitworth*, and Mr. *Charles Lancaster*, were severally examined.

[Adjourned till To-morrow, at One o'clock.

Martis, 21° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Monsell.	Colonel Dunne.
Colonel Boldero.	Mr. George Dundas.
Mr. Newdegate.	Lord Seymour.
Mr. Geach.	Colonel Lindsay.
Mr. Muntz.	

Major *Robert Bruce*, examined.

Mr. *Charles Lancaster*, further examined.

Mr. *Richard Prosser*, examined.

[Adjourned till To-morrow, at One o'clock.

Mercurii, 22° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Monsell.	Colonel Dunne.
Mr. Muntz.	Mr. Newdegate.
Mr. George Dundas.	Mr. Geach.
Lord Seymour.	Colonel Boldero.
Colonel Lindsay.	Lord Paget.
Mr. Walpole.	

Mr. *Richard Gunner*, examined.

Captain Sir *Thomas Hastings*, R.N., further examined.

Mr. *Charles Milward*, examined.

[Adjourned till To-morrow, at One o'clock.

Jovis, 23° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair:

Mr. Monsell.	Lord Paget.
Colonel Boldero.	Mr. George Dundas.
Mr. Newdegate.	Mr. Geach.
Mr. Muntz.	Colonel Dunne.
Lord Seymour.	Colonel Maule.
Colonel Lindsay.	

Mr. *Charles Milward*, further examined.

Mr. *John Goodman*, Mr. *Vanwart*, and Mr. *Thomas Lawrence*, severally examined.

[Adjourned till To-morrow, at One o'clock.

Veneris, 24° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Monsell.	Mr. Newdegate.
Lord Seymour.	Lord Paget.
Colonel Dunne.	Mr. George Dundas.
Colonel Boldero.	Mr. Walpole.
Mr. Muntz.	Mr. Geach.
Colonel Lindsay.	

Mr. *Charles William Lancaster*, further examined.

Mr. *Thomas Lawrence*, Mr. *Joseph Brazier*, and Mr. *William Scott*, severally examined.

[Adjourned till Monday, at One o'clock.

Lunæ, 27° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Monsell.	Lord Paget.
Mr. Walpole.	Lord Seymour.
Colonel Boldero.	Mr. George Dundas.
Mr. Newdegate.	Mr. Geach.
Mr. Muntz.	Colonel Lindsay.
Colonel Dunne.	

Colonel *Alexander Gordon*, examined.

Mr. *James Gunner*, further examined.

[Adjourned till To-morrow, at One o'clock.

Martis, 28° *die Martii*, 1854.

MEMBERS PRESENT:

Mr. Monsell.	Mr. Muntz.
Mr. George Dundas.	Colonel Dunne.
Colonel Boldero.	Lord Seymour.
Mr. Newdegate.	Coloney Lindsay.
Mr. Geach.	Mr. Walpole.

Mr. *Monsell*, in the absence of Sir *William Molesworth*, is called to the Chair.

Mr. *James Gunner*, further examined.

Mr. *Richard Aston* and Mr. *John Swindburne*, severally examined.

[Adjourned till To-morrow, at One o'clock.

Mercurii, 29° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Monsell.	Colonel Dunne.
Colonel Boldero.	Mr. Geach.
Mr. Newdegate.	Colonel Lindsay.
Mr. Muntz.	Mr. Walpole.
Lord Seymour.	Mr. George Dundas.
Lord Paget.	

Mr. *John Swindburne*, further examined.

Mr. *John Stephenson* and Mr. *Isaac Sheath*, were severally examined.

[Adjourned till To-morrow, at One.

Jovis, 30° *die Martii*, 1854.

MEMBERS PRESENT:

Mr. Monsell.	Lord Seymour.
Colonel Boldero.	Mr. Newdegate.
Mr. Muntz.	Mr. Geach.
Colonel Dunne.	Mr. George Dundas.
Lord Paget.	

Mr. *Monsell*, in the absence of Sir *William Molesworth*, is called to the Chair.

Mr. *John Barnet*, Mr. *David Wilton*, Mr. *William Tranter*, and Mr. *Thomas Russell*, were severally examined.

[Adjourned till To-morrow, at One o'clock.

Veneris, 31° *die Martii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Monsell.	Colonel Dunne.
Colonel Boldero.	Lord Paget.
Mr. Newdegate.	Lord Seymour.
Mr. Muntz.	Mr. George Dundas.
Mr. Geach.	Colonel Lindsay.

Colonel *John Bonner*, examined.

Mr. *Edward Bond*, and Mr. *Thomas Hunt*, were severally examined.

[Adjourned until Wednesday next, at One o'clock.

Mercurii, 5° die Aprilis, 1854.

MEMBERS PRESENT:

Mr. Monsell.	Lord Seymour.
Colonel Boldero.	Lord Paget.
Mr. Newdegate.	Mr. Muntz.
Mr. Geach.	Colonel Lindsay.
Colonel Dunne.	Mr. George Dundas.
Mr. Walpole.	

Mr. *Monsell,* in the absence of Sir *William Molesworth,* is called to the Chair.

Mr. *John Macdonald,* Mr. *Joseph Thompson,* Mr. *John Evans,* Mr. *Robert Pritchett,* and Mr. *Charles Clark,* were severally examined.

[Adjourned till To-morrow, at One o'clock.

Jovis, 6° die Aprilis, 1854.

MEMBERS PRESENT:

Mr. MONSELL, in the Chair.

Lord Seymour.	Mr. George Dundas.
Colonel Boldero.	Colonel Dunne.
Mr. Muntz.	Mr. Geach.
Mr. Newdegate.	

Mr. *Charles Clark,* further examined.

Mr. *Gage Stickner,* and Mr. *Anderson,* were severally examined.

Committee deliberated.

[Adjourned to To-morrow, at One o'clock.

Veneris, 7° die Aprilis, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Monsell.	Lord Seymour.
Colonel Boldero.	Mr. Walpole.
Mr. Newdegate.	Colonel Lindsay.
Mr. Muntz.	Colonel Maule.
Colonel Dunne.	Mr. George Dundas.

Mr. *Westley Richards,* examined.

Committee deliberated.

The following Resolutions, proposed by the Chairman for the consideration of the Committee, read 1°, as follows:

"1. That it is the opinion of this Committee that the supply of fire-arms for Her Majesty's service should be provided partly by a system of contracts and partly by a Government factory.

"2. That, for this purpose, a manufactory of small arms should be established under the superintendence of the Board of Ordnance.

"3. That this manufactory should act as a check upon the price of contractors, and as a resource in times of emergency, and should be constructed and arranged with a view to its economical working, and on a site which may hereafter admit of its extension.

"4. That the cost of construction, of maintenance, and the charge for all materials and labour in this factory should be kept distinct from those of other Ordnance establishments, so that the whole expenditure may be readily seen, and the price of the small arms ascertained.

"5. That it is desirable, before any large stock of new and expensive machinery is purchased by the Board of Ordnance, that the details of such machinery should be well considered, and all practicable experience of its working should be obtained.

"6. That for this purpose the Board of Ordnance should at once carry out their intention of sending some of the officers to inspect the machinery now employed in the United States in the manufacture of small arms."

Motion made, and Question proposed, "That it is the opinion of this Committee that the supply of fire-arms for Her Majesty's service should be provided partly by a system of contracts and partly by a Government factory." Amendment proposed, to leave out from the second word "That," to the end of the Question, in order to add the words: "The system of contracting for the supply of small arms should not be discontinued without further proof that a sufficient supply cannot be obtained under it," (Mr. *Muntz*), instead thereof. Question put, "That the words proposed to be left out stand part of the Question." Committee divided:

Ayes, 3.	Noes, 7.
Mr. Monsell.	Colonel Boldero.
Colonel Lindsay.	Mr. Newdegate.
Mr. George Dundas.	Mr. Geach.
	Mr. Muntz.
	Colonel Dunne.
	Lord Paget.
	Lord Seymour.

Words added. Main Question, as amended, put and agreed to.

Resolved, "That it is the opinion of this Committee that the system of contracting for the supply of small arms should not be discontinued without further proof that a sufficient supply cannot be obtained under it."

Motion made, and Question proposed, "That, however, a manufactory of small arms should be established under the superintendence of the Board of Ordnance." Amendment proposed, to leave out from the word "That," to the end of the Question, in order to insert the words: "A manufactory of small arms to a limited extent be kept up at Enfield, under the superintendence of the Board of Ordnance," (Mr. *Muntz*), instead thereof. Question put, "That the words proposed to be left out stand part of the Question." The Committee divided:

Ayes, 6.	Noes, 6.
Mr. Monsell.	Colonel Boldero.
Colonel Lindsay.	Mr. Newdegate.
Colonel Dunne.	Mr. Geach.
Mr. George Dundas.	Mr. Muntz.
Mr. Walpole.	Lord Paget.
Colonel Maule.	Lord Seymour.

Whereupon the Chairman declared himself with the Ayes.

Another Amendment proposed, after the word "Ordnance," to add the words: "to a limited extent," (Mr. *Monsell*). Question, "That those words be there added," put and agreed to. Main Question, as amended, put and agreed to.

Resolved, "That, for this purpose, a manufactory of small arms should be established under the superintendence of the Board of Ordnance to a limited extent."

Motion made, and Question proposed, "That this manufactory should act as a check upon the price of contractors, and as a resource in times of emergency, and should be constructed and arranged with a view to its economical working, and on a site which may hereafter admit of its extension." Amendment proposed, to leave out all the words after the word "Working," to the end of the Question," (Mr. *Monsell*). Question, "That the words proposed to be left out stand part of the Question," put and negatived. Main question, as amended, put and agreed to.

Resolved, "That this manufactory should act as a check upon the price of contractors, and as a resource in times of emergency, and should be constructed and arranged with a view to its economical working."

Motion made, and Question, "That the cost of construction, of maintenance, and the charge for all materials and labour in this factory should be kept distinct from those of other Ordnance establishments, so that the whole expenditure may be readily seen, and the price of the small arms ascertained," put and agreed to.

"Motion made, and Question, "That it is desirable, before any large stock of new and expensive machinery is purchased by the Board of Ordnance, that the details should be well considered, and all practicable experience of the working of such machinery should be obtained," put and negatived.

Motion made, and Question, "That for this purpose the Board of Ordnance should at once carry out their intention of sending some of the officers to inspect the machinery now casting in the United States," put and negatived.

Motion made, and Question, "That the system of contracts may be rendered more efficient by the adoption of regulations in regard to the mode of contracting, the delivery of patterns for work to be executed, and in regard also to the view of articles supplied by the contractors," (Lord *Seymour*), put and agreed to.

Motion made, and Question, "That the Chairman be requested to draw up a Report, embodying the purport of these Resolutions," (Lord *Seymour*), put and agreed to.

[Adjourned.

Martis, 2° die Maii, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Monsell.	Mr. Muntz.
Colonel Boldero.	Colonel Dunne.
Mr. Newdegate.	Lord Seymour.

Draft Report proposed by the Chairman, read 1°, as follows:

"YOUR Committee have considered carefully the questions referred to them, and have examined evidence.

"The result of their investigations may be conveniently divided into two heads:

"1st. The existing sytem of providing Small Arms for Her Majesty's service, and its results;

"2d. The system which the Ordnance Department have proposed to substitute for it.

"At present the materials (as the component parts of the musket are termed) are provided by open tender from the material makers.

"A small portion of the materials when received are set up (that is fitted together) in the Government establishment at Enfield.

"The remainder are set up by contract.

"The contracts, whether with the material makers or the setters up, always specify the periodical rate at which the work contracted for is to be done.

"All the articles contracted for are subjected to a strict system of examination or view; the view is conducted by viewers, who are under the direction of the Inspector of Small Arms.

"Complaints made by the manufacturers of an unfairness in the view are made to the Inspector of Small Arms, and from his decision there is an appeal to the Master-general and Board of Ordnance.

"The Master-general and the Comptroller of Stores both gave evidence to Your Committee on the working of this system.

"Lord Raglan, the Master-general, stated that he was charged with the responsibility of providing a sufficient supply of Small Arms for the defence of the country, and that he was not satisfied with the present mode in which that supply is obtained.

"He added, that his objection did not apply to the details of the system only, but to its essence, and that he considered it unsafe for the country to go on without subsituting for it arrangements by which the supply of Small Arms should be independent of contractors.

"This opinion was shared in by Sir Thomas Hastings, the Comptroller of Stores, who has filled that office for eight years, and who has the charge of that branch of the Ordnance Department which relates to the supply of Small Arms.

"The result of his experience during the last three years was stated by Sir Thomas Hastings.

"In May 1851 the Minié arm was first introduced in the British service. Steps were taken to procure 23,000 of them from the gun trade. The whole number was not supplied until November 1853. In the month of April last year a new artillery carbine was required. Steps were taken to procure it, and as yet only 500 have been brought into store. 270. 273.

"The Board of officers to whom the pattern of arms is referred were directed in 1852 to consider whether the Minié pattern of 1851 could be improved; and on their report the Commander-in-Chief and Master-general decided in 1853 on an improved pattern. Steps were taken to procure 20,000 muskets of the improved pattern, but it appears that up to this time none have been supplied. 284.

"It appeared that these delays were occasioned more by the material makers than by the setters up, and were much increased by the high quality required for the new Minié musket. In answer 109, Sir Thomas Hastings said it was one thing to make a perfect arm like the present one, requiring all skilled workmen, and another thing to fulfil a contract for arms which did not require men so highly skilled, and that if he could have obtained the materials, he would have gone on months ago to set up the new arms in London, but he could not put out additional contracts, because he could not get the materials; and it was a very serious thing, he added, for that department of the Government which is charged with holding the country in a state of readiness to meet an invasion, that they should not in one year be able to get 28,000 muskets.

"Various reasons have been alleged for these delays. On the one hand statements have been made that the delays resulted from combinations and strikes among the workmen, and from the paucity of skilled hands in the military gun trade.

"It appears that the gun trade may be divided into three classes: The first is occupied with making sporting arms highly finished and of high price.

"The second is the military gun trade, which supplies the arms for Her Majesty's service and for the East India Company.

"The

"The third, and much the largest class, produces an inferior kind of arms for exportation.

"The rate of wages paid in the first class is very high. Therefore the second class, which, on account of the want of continuity in the demands of the Government, is at present a small one, can only be recruited by the importation of workmen from the third class. And it has been stated in evidence that such importation cannot be made to any extent, unless there is a certainty that the demand for the services of the workmen will be continuous; and, consequently, that any large order for small arms would create at once a state of things in which the demand for skilled workmen would be large and the immediate supply small.

"The following extracts of letters received by the Board of Ordnance were laid before Your Committee to show the various reasons assigned by contractors for not punctually fulfilling their contracts for the delivery of the materials of small arms:

301, and Appendix. "On the subject of locks, Messrs. J. Brazier & Sons, stated on 16th January 1854, 'The delay of sending our supply is caused by the unwillingness of the men, refusing to make the locks at the price we understood was to be paid.'

"With regard to rods, Messrs. T. & C. Gilbert stated, in a letter of the same date, 'We have been disappointed by two of our oldest rod hands, who promised to come to work, but have not.' Messrs. Heighington & Lawrence stated, 'Our blade-forger, the only one we have who can forge bayonet-blades, has had a severe illness for three weeks.' Mr. H. Clive stated, on the subject of barrels, 'My nonfulfilment of your contract for last month arose from two causes: My not being able to make arrangements with my men as soon as I had anticipated, and from the frost and want of coal.' Mr. J. Clive, on the same subject, stated, 'Delay from continued strike of workmen.'

"Mr. Ezra Millward stated, on the 16th January 1854, 'The deficiency in the supply of the barrels agreed to be delivered by me has been occasioned by my men; the grinders and filers turning out for price.'

"With regard to bayonets, Messrs. E. & G. Rowe stated, We have been behind with the supply; but have had a great difficulty in procuring workmen.'

"Messrs. Beasleys and Farmer stated, on the 17th January 1854, 'The delay has been caused by a strike of our workmen.'

"Messrs. J. Brazier & Sons again stated, with respect to locks, 'In the first place, there was a strike with the men, refusing to file them (the locks).'

"A letter signed by B. Turner on behalf of the workmen of the gun trade, received 3 February 1854, stated, 'But since then some of them (the masters) think the price (for locks) too much, have called a meeting of the masters and met at the Turk's Head, Wednesbury, where they combined together, and, as we are informed, given or signed a bond to each other to give no more than 6*s.* per lock, and go as far as to say they are having the work in faster than they want, which has induced us to stand, though much against our will; therefore we humbly beg your consideration on our case, and adopt such plan as will put down this oppression that is bearing upon us, and will cause us to take to other sort of work, which will injure your supplies, if they are wanted. The trade is in great confusion, and we must look for other sort, which will keep us on regular for the support of our families.'

"Messrs. John Roe & Son stated, 'We have great difficulty in getting men to finish and fit them (bayonets) properly. If you would allow us a little ease in the inspection, we should be very thankful.'

"Mr. John Clive wrote—

"'274, Newton Road, Birmingham,
"'Sir, 17 January 1854.

"'In answer to your inquiry respecting the delay with Order 6,411 barrels of 'New Rifle Musket,' I beg to inform you that it was occasioned by the continued strike of our workmen. Allow me to add, that a satisfactory arrangement having been made with them, they are now at work. I passed 54 barrels at view last week, and hope to send 100 more for view this week, and have every reason to expect I shall very soon be able to make up the arrears.

"'I remain, &c.
"'G. Butler, Esq. (signed) "'*John Clive.*'

"Messrs. J. Roe & Son and E. W. & E. Roe stated, 'The bayonets now being made are far superior to anything that has been made before. We have, therefore, great difficulty in getting men to finish and fit them properly.'

"To rebut the statement that it was difficult to obtain by contract the supply of Small Arms required for Her Majesty's service, many contractors and persons connected with the Birmingham and London Gun Trade appeared before your Committee.

"They showed that large supplies of Small Arms had been made by the trade, in former years, for the Ordnance and East India Company, and that large quantities of arms, of British manufacture, had been exported both to private dealers abroad and to foreign governments. These facts they stated to prove the extent of the producing power of the country.

"They attributed the delays of which the Board of Ordnance complained to the want of continuity in the demands for Small Arms, and to the vexatious view to which the several parts of the muskets manufactured for the Board of Ordnance were subjected, and they contrasted the difficulties which the Board of Ordnance had on this account experienced,

rienced, with the facility which the East India Company had found in procuring a supply of arms.

"The opinions of the persons connected with the Gun Trade seemed to be uniform on these points.

"Their evidence contained ample details of the success which had attended their exertions to supply foreign governments, even in the years of political disturbance, when the demands were at once large and sudden.

"A statement was put in by Mr. Barnet, a London gun-maker, showing that from 1841 to 1850 inclusive, 584,376 stand of arms of all sorts were set up by the London Gun Trade for the Government and East India Company.

"Every witness stated that if the demands of the Government were continuous, they could be supplied to any extent, and that although in the first year after the demand commenced, only a limited number of workmen could be got together, in the second year the supply might be almost indefinitely increased.

"Some of the Birmingham gun-makers stated that they would be ready, in the event of a continuous demand, to provide any amount of machinery in their establishments which might be required to cheapen and hasten production.

"They also agreed in their statements as to the system of view.

"None of them objected to the principles upon which the view is regulated, nor to the manner in which, at the present moment, those principles are carried out. But they all asserted that until a very recent period the view had been vexatious.

"The makers of locks, bayonets, and other materials adduced instances of the grievances to which they alleged that they had been subjected; and attributed to the annoying character of those grievances the fact that many workmen had left the trade, and that parents are unwilling to bring up their children to it; but it should be observed, that appeals against the view have been rarely made to the Master-general and Board of Ordnance, and that when an appeal has been made it has been at once considered and adjudicated upon.

"It was stated also that the Ordnance made only one pattern of the Small Arms which the contractor was bound to copy, and that the impossibility of obtaining simultaneous access to this pattern occasioned much inconvenience to the contractor.

"Colonel Bonner, the inspector of stores of the East India Company, described to Your Committee the system under which Small Arms are procured by the East India Company. They have a list of contractors for setting up and making the materials of muskets. The smaller articles, such as screws, nails, and swivels, together with the stocks, are provided by the setters-up. Each of the other parts of the musket is got directly from the persons whose trade is to manufacture it. When a supply of muskets is required by the Company, Colonel Bonner ascertains the Ordnance prices, and calls together the setters-up and material makers. He shows them the pattern gun, and discusses with them the price. The price is then fixed by discussion and arrangement, and not by competition. 6495.

"Colonel Bonner stated that he has never found any difficulty in obtaining supplies within a reasonable time, nor any change in price in consequence of the demands of the East India Company. 6454.

"Colonel Bonner, however, said, that he had had no experience as to the supply of Minié muskets, as none had been yet ordered by the East India Company, who have purchased only 5,000 muskets in the last three years.

"The experience of the East India Company, therefore, though most valuable, does not refer to those years, or to that arm, to which Lord Raglan and Sir Thomas Hastings referred.

"The complaint of the contractors, that the orders of the Government for Small Arms have not been continuous, raises a question of great importance. There is no doubt that a large demand for Small Arms, spread over a number of years, would attract to the gun trade a supply of hands sufficient to meet the demand. Even in the first year considerable additional supplies might by this means be attained, and in each successive year the increase would be augmented. On the other hand, it has been observed that it would not be judicious on the part of the Board of Ordnance to pledge themselves to large and continuous orders, for in this age of rapid invention, such a course might be attended with very inconvenient consequences. For instance, the pattern of 1853 has been substituted for that of 1851; therefore, if large orders for the pattern of 1851 existed, they would be orders for a now obsolete arm. Some new pattern may soon supply the place of that which is now ordered. This consideration has also a direct bearing upon the question of the expediency of substituting large producing powers for large stores, to which Your Committee will presently allude more particularly.

"The following answers of Mr. Lancaster, the eminent gun-maker and inventor, have an important bearing on this question. He was asked, 'If large orders were issued for this pattern of 1853, would not there be a gradual increase of the skill required for that kind of work?—*Answer.* Most clearly so; if you give out a regular and constant succession of orders for large numbers for a series of years, there is no question that you may get together or aggregate a quantity of labour equal to that; there is not the least question that you may produce 200,000 a year, if you give time to get together the labour. 2593.

"'*Question.* Have you considered what peculiar advantages the Government possess in adopting the manufacture of arms, or of anything else, as compared with private enterprise?—*Answer.* That is a question of imperial policy. My impression of an establishment, call it 2594.

it Government or otherwise, that would embrace the most perfect development of machinery, is this, that is, as compared with gathered together labour, that it would have these advantages, it would have an establishment and machinery capable of producing any number you please to say, and make an establishment for that requisite power; now, if you intermit the supply from the war demand to the peace demand, it is true your machinery will stand still; but you may suddenly increase that supply again to the war demand upon very short notice indeed. On the other hand, with aggregated labour, though you may procure gradually and educate by degrees any number of workmen you please, to produce any quantity you want, still if you intermit the demand, and do not give those workmen sufficient work to proceed with, that labour will be dissipated to the four winds of heaven, and will employ itself wherever it can. These are the comparative advantages between a great establishment of machinery, and one in which you aggregate labour to do the work for any given number.'

"Your Committee will now proceed to consider the plan by which the Master-general and Board of Ordnance propose to meet the difficulties to which they are now exposed in obtaining a supply of small arms.

"They propose to take the whole manufacture of muskets for Her Majesty's service into their own hands, and to erect a large factory in which the parts of the musket should be made principally by machinery.

"They directed plans to be prepared for a Small Arm Manufactory, capable of producing 500 muskets per day.

"The buildings were to be constructed on those principles by which the greatest economy and easiest supervision of labour can be secured.

"Sufficient space was to be provided to allow of that extension and development which the rapidity of discovery in this age renders desirable.

"The machinery was to be the best which the present state of science can imitate or invent.

"In compliance with these directions a plan of a factory was prepared by Mr. Anderson, an eminent mechanist in the service of the Board of Ordnance, who told your Committee,
350. 'In devising and arranging the plan of a New Small Arm Manufactory, considerable attention has been directed to the great importance of having all the operations consecutive, in order that the material may not have to be conveyed from one place to another unnecessarily, nor have to go over the same ground twice during the period of their manufacture. Another leading feature in the proposed factory is the principle of having almost all the operations carried on in one room, instead of having the several branches in separate workshops. Any departure from having all the operations carried on in one room arises from the peculiar nature of that process rendering it inadmissible into the general factory; such, for example, is the smithery, where the wrought iron and steel articles are forged from the raw material; the brass foundry, where the several castings of a gun are made; and also, the room where the hardening, case hardening, tempering, browning and colouring goes on. In all of these departments, the heat of the furnaces, together with the dust and smoke, would interfere with the nice operations and machinery of the general finishing room.

"An examination of the accompanying plan will show the general order of the proposed arrangement, the whole of the works being on the same level. At the back of the factory, running in a line with the smithery, boiler-house and foundry, is the coal-yard, to be supplied by railway from the wharf. The smithery, where the barrels, bayonets, ramrods and other forgings are prepared, will contain the necessary furnaces, forges, rolling-mills and other forging machines, some of which will be driven from the steam-engine of the manufactory, but the greater number will be worked from the waste heat of the several iron furnaces, by the employment of stack boilers; in other words, a steam boiler forms the chimney of the furnace in which the iron is heated. The smithery is a room 235 feet by 60 feet. From the smithery the several forgings will pass out into the great room, and will have to work their way, in a straight line, to the other side of the factory, by passing through one machine after another until completed. On the other side of the steam boiler house is situated the brass foundry, and the furnaces of the desiccating rooms, in order that one tall chimney may serve for the three departments. The brass castings from the foundry, and the seasoned gun-stocks from the desiccating chambers, will pass into the manufactory, and pass through the several machines, across to the other side; and in the progress of the different articles from one machine to another they will be subjected to constant examination, in order to detect any error that may arise, either from wearing of the tools or other causes. This room is 500 feet in length by 180 feet in width, and will be covered over with what in Lancashire is termed the 'saw roof,' from its resemblance to the edge of a carpenter's saw; the sloping side of the 'tooth' is slate, the other side is glass, and so constructed as that all the windows face the north, thus excluding the sun's rays, at the same time affording a perfect flood of light all over the manufactory. This roof will be supported on iron pillars, which will also carry the shafting for conveying motion, and the steam pipes for warming. A large workshop is found to be the best preventive of idleness, by having all in the presence of each other, and it reduces the cost of superintendence. As the several articles, such as barrels, bayonets, stocks, locks, &c., reach the other side of the factory in an almost finished state, they will be taken up and conveyed by rail to their respective places: for example, the barrels will pass on to the proving-house, and most of the others to the tempering-room, to be completed for store. As the articles are finished, they will pass by rail into a store-room, where they will be subjected to a most rigid examination; after which they will be deposited in tiers, of such dimensions as will correspond with the bulk of the article.

article. In a line with the railway, but on a raised gallery or platform, the men who set up the musket, termed 'assemblers,' will be supplied with the several parts from the store, and who will there connect them together into muskets; and from this gallery they will pass into another store as finished arms. There are two steam engines, each of 50-horse power, of the double cylinder construction, in order to economise fuel. Five steam-boilers, one of which will be used for warming the building in cold weather; for there is nothing better fitted to keep men in good working order than a light clean workshop, at a genial temperature. The motion is distributed over the works by shafting, as shown in the plan, namely, one shaft through the entire length of the room, from which the motion is transmitted by 24 transverse shafts, each 160 feet in length. The manufactory will be fitted up with fans to extract the dust from all grinding processes, and everything will be done which will tend to promote production or add to the comfort of those who are employed.'

"In order to guard as much as possible against risk of failure, communications were entered into by the Board of Ordnance with some of the principal machinists, tool makers, and engineers, both in England and Scotland, and it was resolved that officers should be sent to the United States to inspect the machinery there.

"Accordingly, Colonel Burn, Assistant Inspector of Artillery, left England on the 28th March, and Lieutenant Warlow and Mr. Anderson were to have followed on the 4th April, for the purpose of examining the small arm works of America, the quality of the arms produced, the various machines in use for the construction of muskets, together with every appliance to economise labour which had been introduced. And after studying the system both in the Government establishments and in private works, where machinery is applied, a full report was to be sent to the Master-general and Board of Ordnance, and then such machinery as could be procured in the United States, but was not to be obtained with equal advantage in this country, was to be purchased or ordered.

"It was considered probable that the purchases in the United States would be limited to the wood-work machines, and that all machinery for iron or brass work could be procured with greater advantage at home.

"Subject to the result of these inquiries, it was intended that steam machinery should be used to forge the parts that are made of steel or wrought iron, and that the stereotype system of moulding and casting should be applied to the parts made of brass.

"Self-acting machinery was to be employed to bore and turn the barrels, and machines, similar to those used at Springfield, were to be used for the stocks.

"As to the probable success of this plan, the most important evidence given was by Messrs. Anderson, Nasmyth, Whitworth, and Prosser, four eminent machinists, who appeared before Your Committee.

"Mr. Anderson stated his opinion, that every part of the musket could be made with advantage by machinery. 344.

"Mr. Nasmyth said, that if the system of machinery and tools of the machine-maker were introduced into the gun trade it would lower the price of the musket and perfect the manufacture, and that it would not be difficult to construct the machinery that would be required.

"Mr. Whitworth said, that the gun trade is capable of great improvement with regard to machinery, and that such machinery would lead both to increased cheapness and efficiency. 1949. 2158. 1951.

"Mr. Prosser was also of opinion, that machinery might be largely introduced into the gun trade. 2644.

"There was considerable difference of opinion between these four gentlemen as to the degree of finish to which the several parts of the musket could be brought by machinery, but all were agreed in opinion that, as a general principle, it would be advantageous to employ machinery in the construction of muskets. This opinion was especially shared by those witnesses who had used machiney the most, and were the best acquainted with its capabilities; for instance, Colonel Tulloh, of the Carriage Department of the Ordnance, and Colonel Colt, whose manufactory was spoken of in high terms as a model of system, order, and of the development of correct principles, most of which were already known in this country, but had not hitherto been applied to the same extent as in Colonel Colt's manufactory.

"The advantage to be derived from conducting manufacturing operations on a large scale, such as that proposed by the Government, as compared with the manner in which the gun trade is now carried on, was also strongly insisted upon by several witnesses. In their opinion, the larger the scale of the manufactory, the greater the number of machines that could be employed together, the greater therefore the subdivision of employments, and the greater the extent to which unskilled labour could be employed for many operations, and even for the superintendence at the same time of several self-acting machines. This was the opinion of Mr. Nasmyth, and others, who gave instances of one individual attending to more than one machine. 1367.

"In a small manufactory this is not so readily attainable, because the number of the employed will not admit of such a subdivision of employments.

"Mr. Lawrence, a bayonet maker in Birmingham, stated that he would introduce bayonet machinery provided he had a large order; that a large continuous order would warrant another system of operations, which would allow the bayonet to be made at a cheaper rate. Colonel Colt, who has had great experience in the use of machinery for making small arms, and of the advantages arising from subdivision of employments, stated that he considered that with a plant which would produce a million Minié muskets in ten years, he could sell 3892. 3935. 1150. that

that weapon for 1*l.* 10*s.*; but that if only 200,000 were required, that they could not be provided for less than 2*l.* 10*s.* a piece.

" Mr. Nasmyth was of opinion that the man who had sufficient capital to make all the 1676. parts of a gun in one establishment 'would be able to enter the market and undersell the man who made the article by scattering the parts among different persons.'

" According to Mr. Prosser, machinery can only be applied with great advantage where 2653. large numbers of articles have to be made.

" With regard to the extent to which machinery could be applied to produce the different parts of a musket, and more especially with regard to the quality of the article when so produced, there was considerable difference of opinion, chiefly with regard to the amount of hand labour that would be required to bring the several parts to that condition which would pass the present view.

" In order to make this point more clear, it is desirable to consider separately the four principal parts of the musket, viz.:

" Stock.

" Up to the present time little has been done in this country towards making the stocks of guns by machinery: they are cut into the required form by hand tools.

" Mr. Scott, a gun-maker, stated that he had attempted to apply machinery to this 4294. purpose, and was in communication with Mr. Jordan, the inventor of patent carving, but they found the existing machines and tools to be inadequate. Many improvements were added, and the operation was stopped on account of his employment ceasing.

" Colonel Gordon stated that a machine for the same purpose had been used for some time at Liege, but was not employed at the present time.

" On the other hand, Messrs. Wallis and Whitworth gave evidence of the existence of machinery in America that accomplished this object in a very superior manner, and which they had seen in actual operation. They stated that the outer surface of the stock made 1727. by it required only a little hand finishing; that the fit of the parts was so perfect, that when a lock was taken from a heap it fitted exactly into the part; that the barrel and every part 1974. of it fitted in the same manner; that sixteen machines were used to finish a single stock, 1975. which were produced very accurately, and liable to no objections which did not apply to 1976. stocks cut out by hand; that the same machines that were used for the musket could be 2033. applied to the carbine; that the whole time required to pass a stock through the machinery 1970. was 22 minutes 4¼ seconds; and the cost of the same work done by hand tools would be 1972. about 10*s.*

" Lock.

" According to the evidence, little machinery is at present used in making the locks of muskets.

" Mr. Prosser, who is well acquainted with the gun trade, said that no lock machinery is employed in this country, except for grinding or polishing, but that proper machines would 2780. reduce the cost of locks 50 per cent., and that the locks of the Russian muskets are made by machinery in a very perfect manner.

" Mr. Lancaster considered that much is to be done with machinery, which would 2422. ensure uniformity in the lock, and then but little skilled labour would be required to 2427. finish it.

" Mr. Goodman considered that, although no part of the lock is at present made by 2429. machinery, yet it might be applied to locks with advantage, and that such locks would be 2430. better and more uniform than those made by hand labour.

" Mr. Swinburne stated that the lock machinery which now exists might be improved 2596. with some small degree of advantage, but that there are some lockmakers who now use 3588. machinery to a great extent.

" Mr. Nasmyth was of opinion that the more intricate parts of the lock, such as the cock 5499. and the guard, could be done by special machines; and he showed to the Committee parts 1387. of Russian locks made by machinery. 1389.

" Barrel.

" Greater difference of opinion was expressed with regard to the advantage of applying machinery to making the barrel than any other part of the gun. The present system of boring was generally allowed to be rude, but considerable doubt existed among gunmakers as to the possibility of improving it.

" According to Mr. Millward, more machinery has been applied to the barrel than to 3387. any other part, and the machinery which he employed saved him 30 per cent. in labour. 3285.

" Mr. Prosser thought the present system of boring a 'bungle,' and capable of being 2753. improved.

" Mr. Whitworth expressed his opinion that great improvements might be made, and 1987. that the barrels might be finished on the outside by self-acting machines, without grinding. 2008.

" It appears that machinery for rifling muskets has been little used in England; but a 1994. French machine has been lately applied to this purpose. 6651.

" Colonel Gordon said that the system of rifling which is practised in Belgium is more 404. correct, cheaper, and does not injure the health of the workmen so much as ours.

" Mr. Whitworth contemplated a machine that would rifle a number of gun-barrels at 1998. the same time. This machine would be self-acting, and would execute the work with greater precision than by the present system.

" Bayonets.

"Bayonets.

"It was generally allowed that machinery might, with advantage, be applied to the making of bayonets.

"Mr. Anderson proposed a series of machines for the bayonet, by which he considered that the price would be much reduced.

"The financial effects of the proposed factory were considered in two aspects.

"It was said that there could be no doubt that the Ordnance, by having a large producing power at their disposal, would be enabled to dispense with the necessity of keeping a large number of muskets in store, and that thus the losses occasioned by patterns becoming obsolete would be much lessened. And it should also be borne in mind, that if the Ordnance, by the possession of a factory, were able to diminish their store by the number, for instance, of 200,000 muskets, the annual interest on the cost of 200,000 muskets would be saved to the country. It was admitted to be difficult to calculate with any accuracy the amount of saving in the production of each musket which would result from the use of the proposed machinery. The present cost of the Minié musket was stated by Sir Thomas Hastings to be 3 *l.* 9 *s.*

"It appeared that Mr. Anderson had frequently framed estimates for machinery invented by himself, and that his estimates had proved to be correct.

"He estimated that the cost of a musket made by the machinery which he proposed to use would be considerably less than 30 *s.*; and Mr. Nasmyth expressed his opinion that Mr. Anderson's estimate was not too low.

"Colonel Colt offered to supply 1,000,000 new pattern Minié rifles, at 30 *s.* each; and this was insisted upon as a remarkable verification of Mr. Anderson's calculations.

"Your Committee have now described the general plan by which the Board of Ordnance proposed to meet the difficulties in which the supply of Small Arms for Her Majesty's service is at present involved. The Board considered it of great political moment to place in the hands of the Government the means of rapidly producing, on an emergency, a large supply of arms.

"They believed that great savings would result from their being enabled, in this age of rapid invention and consequent change, to dispense with large stores.

"They relied on Mr. Anderson's calculations, supported by the approved accuracy of his former estimates, and confirmed by the opinion of Mr. Nasmyth and others, and by Colonel Colt's tender, as reasonable grounds for expecting a considerable reduction in the cost of muskets, if they were made by machinery.

"But the Board of Ordnance were able to produce little positive evidence as to the degree of finish which could be given to a musket by machinery.

"Mr. Whitworth was of opinion that the parts of the American musket are more identical, but not so well finished as our own; for instance, that any two American locks more nearly resemble one another than any two of our locks do; but that the American lock is not so well finished as our own.

"It was rather on the identity of the parts than on superiority in American workmanship, that Colonel Colt rested his opinion that the American musket is better than ours. The lock of his pistol, though adequate to its purpose, is much inferior in workmanship to that of the Minié rifle. Mr. Gunner, however, stated that the remainder of his arm is of good workmanship.

"From these statements, it appears that the opinion of the Board of Ordnance as to the efficiency of the weapon which they propose to construct, relies mainly upon the judgment formed by scientific men as to the capabilities of machinery. This judgment cannot be satisfactorily tested by experience until the return of the officers who have proceeded to the United States. But Mr. Whitworth's reply to the following question, as to his proposal for gauging and milling barrels, has a general application. He was asked:

"'Then the first application of your proposal must be in some degree in the nature of an experiment?' 2063.

Ans. "'You can hardly say that it is an experiment, when you have machinery employed for similar purposes. I should not consider it an experiment at all. I am as certain about it as I can be about anything.'

"On the general question of the expediency of placing Small Arms in the category of those exceptional articles which it is expedient for a Government to produce for itself, Colonel Gordon was examined.

"That officer was sent to Belgium to inquire into the arrangements under which the Government of that country is supplied with Small Arms.

"He found that, about 15 years ago, the Belgian Government had been exposed to difficulties of a similar character to those of which the Ordnance complain, and had met them by establishing a Small Arm factory; and the Belgian Government now manufacture the whole of their arms. 4330 and following portions.

"He was informed that by this means the cost of the musket had been reduced, and that the improvement and development of the private trade had not been impeded. 2233.

"Mr. Whitworth, while he said that, generally speaking, his impression would be that a Government manufactory is not economical, mentioned as exceptions to this rule the manufactory of Small Arms at Springfield, in the United States, and the Royal Carriage Department at Woolwich.

"The merits of the latter establishment were strongly insisted upon by Mr. Nasmyth, and it

it seems to contrast strongly in efficiency and economy with those Government establishments in which machinery is not largely used.

"On all these points, however, the London and Birmingham gun-makers, who appeared before Your Committee, expressed opinions very opposite to those which have just been stated.

"They considered the whole of the grounds upon which the proposed factory are advocated to be visionary; to rest upon theory, and not upon experiment; and to be contradicted by the universal experience of practical men.

"They affirmed that the gun trade of this country has already introduced machinery, wherever by doing so the ends of economy and efficiency have been found to be promoted by its introduction.

6199. 6240. 6241. "Many of them adduced instances of machines having been tried and abandoned on account of their not answering the purpose for which they were intended, or not executing the work so cheaply as it was executed by hand labour.

"Mr. Tranter, a gun-maker, doubted the advantage of applying machinery to stocks; it might, he said, be applied to remove some of the rough wood, but nothing beyond that.

5776. "Mr. Sheath, also a gun-maker, considered that there is nothing new in stock machinery, and that it would have been used had there had been any advantage in doing so; that no increase can be made to the machinery now used for making locks, and that generally the trade employ machinery as far as they can, and that whenever they see an advantage in putting up more, they do so.

"Mr. Barnet, a gun-maker, did not see that machinery would be much advantage to the gun trade.

"Similar opinions will be found to have been expressed by a variety of witnesses, both from London and from Birmingham, and Mr. Westley Richards, although he fairly stated that he was not scientifically acquainted with machinery, gave his high sanction to the opinion that no very large addition could be made with advantage to the amount of machinery now used in the gun trade.

"The same Witnesses insisted forcibly on the inexpediency of extending Government establishments for manufacture, and urged that in such establishments the absence of the motive power of self-interest generally led to an absence of energy and economy.

"Such is a condensed statement of the conflicting opinions which have been submitted to Your Committee.

"For detailed statements in support of these opinions they must refer to the evidence of the different Witnesses.

"Upon the whole, Your Committee consider that the system of providing arms by contract ought not to be abandoned, but that sufficient means should be placed at the disposal of the Board of Ordnance to enable them to establish a factory for the manufacture of Small Arms on a limited scale, with the most perfect machinery that, with the aid of science, can be imitated or invented.

"They observe with satisfaction that the present mode, in which the view of Small Arms is conducted, is not complained of, but they think it well worthy of consideration, whether any mode of appeal more simple and prompt than the present one can be devised, by which the contractors may be satisfied that no arbitrary exercise of power on the part of the viewers will ever be used against them.

"Your Committee have observed that the East India Company, as well as the Board of Ordnance, provide only one pattern of the articles for which they contract; but there seems no reason why a larger number should not be provided, if by this means the operations of the contractors could be saved from needless delay.

"Your Committee are of opinion that the course intended to be pursued by the Ordnance of obtaining the benefits of American experience, is a judicious one.

"It would be obviously unwise to erect expensive machinery without taking every practicable precaution to secure its successful working.

"In order that the public may have the fullest means of testing the success of the proposed factory, the accounts of all that is expended for its erection and on its working, should be kept separate from the other expenditure of the Ordnance Department.

"By this means, and by improving in every practicable way the mode in which arms are provided by contract, both systems will receive a fair trial, and at no distant time, the doubts raised in the minds of Your Committee by the conflict of discordant authorities will be resolved by experience."

Committee deliberated.

[Adjourned till Monday next, at One o'clock.

Lunæ,

Lunæ, 8° die Maii, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Walpole.	Colonel Dunne.
Mr. Muntz.	Mr. Geach.
Mr. Newdegate.	Colonel Lindsay.
Lord Seymour.	Mr. George Dundas.
Colonel Boldero.	Lord Paget.
Mr. Monsell.	

Draft Report proposed by Lord Seymour, read 1° as follows:

"In the first place, Your Committee directed their inquiries to the complaints of the Board of Ordnance, in regard to the difficulty of procuring muskets; next, they obtained all the information which they could collect as to the scheme of a large Government factory for the production of muskets; and lastly, they heard from the contractors, and from other persons connected with the gun trade, the statements and suggestions which they had to offer in reference to the present system, and to the best mode of securing a sufficient supply hereafter.

"The existing system has been fully described by Sir T. Hastings, who is a member of the Board of Ordnance, controller of stores, and principal storekeeper. 5.

"He states that all the materials, the component parts of the musket, are in the first instance procured by open contract, and after inspection and approval, placed in the Ordnance Stores. There is a separate contract for each of the separate parts; each is subjected to a strict view or examination by viewers specially appointed for the purpose; accuracy of shape and size is secured by a system of gauges, while other tests are employed to ascertain the strength of the work and the soundness of the material. 20.

"Any contractor who is dissatisfied with the decision of a viewer can, it is said, appeal to the inspector of small arms, and can furthermore bring his complaint, if he shall think fit, under the consideration of the Master-general and Board. 3848.

"A portion of the materials so received into store are issued to the Government establishment at Enfield, to be there set up; that is, fitted together and finished into complete muskets. The chief part of the materials are, however, delivered to contractors who contract for the setting-up, and return the arm to the Board of Ordnance finished and ready for use. In this state it is again subjected to a view.

"Lord Raglan, the Master-general of the Ordnance, stated that he was not satisfied with the mode of supply, because he could not obtain the muskets ordered; and he wished, therefore, to establish a manufactory of small arms, which would render him independent of contractors. He looked forward to making in such an establishment all the muskets required for the public service. 1852. 1875.

"Sir T. Hastings gave evidence to the same effect. He referred to the experience of the last three years as a convincing proof of the impossibility of obtaining a supply of muskets under the present system,

"In May 1851 the Board of Ordnance took steps to procure 28,000 rifled muskets. The contracts were entered into in June 1852, and they were not delivered until November 1853. 270.

"Again, in April 1853, contracts were entered into for 2,000 artillery carbines, and of these 500 only have been as yet delivered.

"So again, in August 1852, a rifled musket of a new pattern was decided upon; 20,000 barrels were ordered, but the materials received were so unsatisfactory, that they had again to be advertised for; and so great has been the delay, that the Board have only been able to enter into a contract for setting-up in September 1854. 284.

"Sir T. Hastings read many letters from the contractors, assigning various reasons for these delays. Combinations and strikes among the workmen, difficulty in procuring coal, illness of a skilled artisan, accident to machinery, were adduced as causes of delay, and excuses for failure in the fulfilment of the contracts.

"Sir T. Hastings informed Your Committee, that a large supply of muskets of the new pattern were now required to be provided as speedily as possible, namely: 11.

"For the line - - - - - - - - -	150,000
" artillery - - - - - - - - -	14,000
" militia - - - - - - - - -	100,000 at least.
"Pensioners - - - - - - - - -	16,000
"Coast guard - - - - - - - - -	14,000
"Marines - - - - - - - - -	12,000
"Navy - - - - - - - - - -	30,000
"Channel Islands militia - - - - - - -	6,000
"Colonial corps - - - - - - - - -	5,000
	347,000

"In

"In addition to this number, the highest military authorities considered that there should be in store for the home service 450,000 stand of arms; whilst the number required in the Colonies amounted to 150,000 more; the total number would, therefore, be upwards of 900,000.

"For the speedy and economical supply of this large amount of muskets, the Board of Ordnance propose to take the whole manufacture into their own hands; and they accordingly directed plans to be prepared for an establishment capable of producing 500 muskets a day.

348. "The details of the plan will be found in Mr. Anderson's Evidence.

"Your Committee endeavoured to ascertain the grounds upon which the Board of Ordnance had arrived at this conclusion, and had felt sufficient confidence to propose to Parliament that a large sum should be voted for the establishment of a manufactory of muskets.

184. 251. "Lord Raglan and Sir T. Hastings stated that they had been guided in their opinion partly by the report of the Commissioners, who during last year visited the manufactories of the United States, and partly by the conversation of Mr. Anderson and of other persons conversant with machinery.

"The advantages of producing muskets by machinery are said to be—cheapness in the manufacture; an exact similarity in the several parts, so that they may be readily interchanged and replaced, and, above all, the facility of rapidly producing muskets, and of increasing or reducing the supply, according to the requirements of the time.

181. "Sir T. Hastings believes that these advantages are now secured to the United States by the system there adopted; for they possess, he says, two factories, each capable of producing 300,000 muskets a year. He also referred Your Committee to the establishment of Colonel Colt, which he thought would enlighten their minds upon this subject.

342. "Mr. Anderson, the chief engineer in the Royal Arsenal at Woolwich, informed Your Committee that he had directed his attention, during some months, to the manufacture of muskets by machinery; and although he considers that there is as yet little machinery in England specially adapted to this purpose, yet there is abundance of talent to produce such machinery if required. Mr. Anderson admits that he knows nothing about a musket, but

363. 771. 362. he thinks that many parts of the rifled musket now adopted might be much improved; a roller lock, for instance, might be substituted for the swivel lock lately introduced; the cock might be more conveniently shaped, with the view to its construction by machinery; the heel-plate might be simplified in its form, and other parts of the musket might be modified without interfering with the efficiency of the arm.

893. 900. "Mr. Anderson thinks that a more definite system of producing and boring barrels might be obtained, but he has not made up his mind on the subject. With regard also to the bayonet, he hopes that an improvement may be introduced in the forging process, though the method of making the bayonet in the new way is not yet determined. In reference to

352. 809. these matters, Mr. Anderson fairly admits, that to undertake to originate a set of machines to do these works is not an easy task, and therefore he considers it desirable to obtain from America such machines as they may possess applicable to the manufacture of muskets, and

993. 1062. he would further wish to go to America in order to study their system on the spot, before commencing operations here.

"The attention of Your Committee having been directed to the American musket, they were desirous of seeing one of the muskets which had been made by machinery, in order that they might compare it with the workmanship of the rifle musket approved here by the

251. 1915. highest military authorities. The Board of Ordnance could not, unfortunately, comply with this request, and indeed it was admitted that they had never themselves seen the musket to which they referred.

"Your Committee had, however, the advantage of examining Mr. Whitworth, an engineer and a manufacturer of machinery, who had been during last year commissioned by the Government to visit the manufactories of the United States, and whose Report has been lately presented to Parliament.

2167. 2177. "Mr. Whitworth said that he had not been specially directed to inspect the manufactories of fire-arms, and had not, therefore, given the close attention to the subject which he would have done, if he had foreseen the present inquiry.

"Mr. Whitworth's evidence shows that at Springfield, the Government establishment of the United States, there is an ingenious system of machinery for the manufacture of gun-

1969. stocks. A gun-stock was completed in his presence within the space of 23 minutes, and this operation was performed entirely by machinery, with the exception of some polishing with sand-paper, a labour which was performed by hand, but which did not occupy more

2036. 2043. 2178. 2015. time than two minutes. As regards working in iron, Mr. Whitworth did not consider the Americans equal to the manufacturers of this country; and having seen the American musket, he thought that its several parts were not so good as the parts of the new musket made for the Board of Ordnance.

2082. "Mr. Whitworth said that he would not recommend the establishment in this country of a Government factory on a scale equal to producing 500 muskets a day, but he would recommend that a trial should be made on a much smaller scale, where all the appliances of machinery could be introduced, which would serve as an experiment, and an example to the gun-trade of this country.

2170. "With reference to the cheapness, Mr. Whitworth could give no decisive opinion, as he had not ascertained the price of a musket made by machinery.

2093. 2154. "He did not believe that the several parts of different muskets made by machinery would interchange; they might be adapted, but they would fit badly. Wherever great perfection of finish and nicety of adjustment are required, recourse must be had to hand labour.

"Mr.

"Mr. Wallis, the head master of the Government School of Art at Birmingham, had also visited the United States as a Commissioner, but he has no practical acquaintance with the manufacture of fire-arms; and his knowledge of machinery had been acquired from residence in manufacturing towns, and not from any superintendence of a factory or business necessarily connected with machinery. 1691. 1739.

"Your Committee also examined Colonel Colt, and several members of the Committee visited his establishment, to which their attention had been specially directed. From his evidence, it appears that the Government of the United States do not provide their muskets solely by a Government factory, but obtain a large portion by contract from private manufacturers. 1076. 1135.

"As regards the cheapness which may be expected to result from an increased employment of machinery in the production of rifled muskets, Colonel Colt said that many parts of the new musket would necessitate the employment of complicated and expensive machines; he thought the arm might be in some respects simplified, and the cost of its production thereby reduced, without detracting from its efficiency. The price of the musket must depend in great measure upon the quantity to be produced according to a given pattern. If the Government were to advance 100,000 *l.* for machinery, the manufacture must be at first slow and the musket more costly, but in the course of 10 years he thought he should be able to produce a million muskets, and at that period their cost would not exceed 30 *s.* each. If only a smaller number were required, the cost of the musket would be increased. 1160. 1191. 1220.

"Mr. Nasmyth considers the systematic introduction of machinery into the gun trade to be feasible and highly desirable. About four years ago he supplied the Russian Government with some machinery for producing parts of a musket; he believes that if proper steps were taken, a factory might be established for 150,000 *l.*, which would be ready to commence working in 18 months from the present time. He considers that in the gun trade, the masters are in a state of dependence upon the skilled workmen, from which they can only be emancipated by the substitution of machinery for hand labour. Manufacturers in many trades are equally prevented from introducing improved processes. Mr. Nasmyth had however not seen a musket produced entirely by machinery. 1357. 1. 1372. 1395. 1541. 1404. 1450. 1500. 1432.

"Your Committee entered into much detail respecting the parts of a musket to which it was stated that machinery or labour-saving machines might be extensively applied.

"Gun-Stocks.

"The evidence seems to justify a belief that though the application of machinery to the formation of gun-stocks has been tried without success in this country and in Belgium, yet a better system has been employed in the United States, which deserves to be introduced as an experiment. It is said that the walnut used in this country is harder and less suited to the work of machines; but this can only be ascertained by trial, and a difficulty of this nature, if it should exist, may probably admit of a remedy. 4553. 5765.

"Barrels.

"No evidence has been given which has convinced Your Committee that any great improvement can now at once be introduced in the boring of barrels. The present system is said to be imperfect, and various suggestions have been offered for its amendment, but it does not appear that the machines have been as yet invented which will effect the object desired. 5781. 1989.

"Machinery for rifling barrels has been used in this country and on the Continent. A machine invented in France, which is used in the Government establishment of Belgium, and which has also been adopted in this country, is said to possess many advantages over the machines generally used for this purpose.

"Gun-Locks.

"It appears that machines have always been used in the manufacture of gun-locks, and if a large number of a similar pattern were required, the employment of machines might be advantageously increased. Whether any great economy will be attained by the use of more machinery in the manufacture of locks appears to be doubtful. 5500. 4048. 4058. 4894. 6579.

"Bayonets.

Mr. Anderson proposes to apply machinery to the manufacture of bayonets, and expects a great reduction in the cost of bayonets so made. The approved pattern bayonet requires, both as to its form and its finish, an amount of labour which has greatly increased its price.

"The result of the evidence as to the advantage of a more extensive application of machinery in the gun-trade appears to be, that wherever a large number of articles, exactly similar in pattern, are required, opportunities are afforded for the application of machinery. The expediency of introducing it must however depend on other considerations, which can only be satisfactorily settled by experience. There seems, however, to be little doubt that if the gun-trade could have confidence that a large supply of muskets would be purchased by the Ordnance in future years, the manufacturers themselves would be anxious to introduce machinery wherever it could be profitably employed.

"The two questions,—namely, the advantage of an increased use of machinery and the expediency of making all muskets in a Government factory, are not, therefore, in any way necessarily connected.

"Your

"Your Committee have heard all that could be urged in favour of a Government manufactory for muskets, but they have not received evidence sufficient to prove that a Government factory would afford the cheapest, most expeditious, and most efficient mode of providing muskets.

2235. "The Royal Carriage Department at Woolwich has been stated to be an instance of the economical application of machinery under Government management.

"It is manifest that no opinion can be justly formed upon such a question unless the accounts were kept like those of a commercial establishment, so that the profit or loss could be correctly ascertained.

"As regards the efficiency of the musket, it is admitted that the rifled muskets made by contract are in every respect equal to those made at Enfield in the Government factory. The arm has been tried in service during the Caffre war, and from the evidence of Major
2399. Bruce, it seems to have answered every expectation; 'it was a most efficient arm, not sur-
2402. passed by the most costly sporting rifles which could be sent from this country.'

"The rifle pattern adopted in 1853 is still further improved; it is admitted by all the witnesses to be a very excellent and highly finished arm.

Lieutenant-colonel Gordon, a member of the Military Committee which decided upon this arm, states it to be his opinion that there is a great deal of work in this approved
4792. musket which is unnecessary. Mr. James Gunner, an officer of the Ordnance well acquainted with the details of the manufacture, states, that 15*s.* could at once be saved in each musket by reducing the finish, without the least diminution in the efficiency of the arm.

"A saving of 15*s.* on each musket would, in a supply of 900,000, amount to a considerable sum.

4618. "The Military Committee appointed to decide upon the pattern to be chosen in small arms, are not practically acquainted with the manufacture, or with the cost of alterations in the musket. The expense is afterwards to be ascertained by the Ordnance.

4818. "Mr. Gunner stated, that considering the work and high finish of the arm, he did regard the price excessive.

"The price of the last approved pattern is 3*l.* 9*s.*, by contract. It is said to be made at Enfield for 3*l.* 4*s.*

5912. "The pattern of the Belgian musket could, it is said, be made at the price of 36*s.* or 37*s.*
4687. each. This arm, although, perhaps, as effective for practical purposes, is not so highly finished in its details. The lock would be rejected by our viewers, and the bayonet is far less expensive.

"With reference to the high price of the approved musket, it is to be regretted that the Military Committee did not dispense with such work as they now deem to be useless. The evidence of the practical gun-makers shows that much of this work not only adds to the cost, but also impedes the rapidity of the supply.

"If, however, the approved musket be now finally decided upon, the price may in many parts be considerably reduced by a better system of contracts, and by convincing the trade of a certainty in the demand.

"With regard to the most expeditious mode of obtaining a supply, Your Committee have obtained much evidence.

6426. "Colonel Bonner, who has for 20 years superintended the supply of muskets for the East India Company, stated that the Company have a regular army exceeding 200,000 men; that their muskets had always been purchased in this country by contract; that their requirements had fluctuated greatly in successive years, varying from 12,000 in one year to 58,000 in another. Yet, he said, the East India Company had never found difficulty in procuring a
6423. supply, nor had they ever found that the contractors took advantage of an emergency to raise their price.

3715. "The general gun trade of this country is said to be increasing. Merchants and gun-
3698. makers have affirmed that they export more extensively than formerly finished guns and
3480. parts of guns, locks especially, and that even in the United States, where machinery is stated
3592. to be so advantageously employed in the gun manufacture, the general gun trade, nevertheless, derive their materials from this country.

"It appears, therefore, from the evidence taken by Your Committee, that the manufacturers of this country can supply the East India Company, and many foreign Governments, and can undersell the manufacturers of almost all other countries; yet they are incapable, according to the statements of the Board of Ordnance, of satisfying the demands of our own Government.

Your Committee endeavoured to ascertain the real causes of this difficulty.

The impediments to this supply may be classed under the following heads: Strictness of view, or severity of inspection.

3184. This cause of delay is particularly mentioned with reference to the contracts of 1851,
5930. since it is admitted that in the course of last year the system of view has not been such as to occasion any complaint.

"It is obvious that in the inspection of the different parts of a musket, although gauges and mechanical appliances are used, much latitude must still be left to the discretion of the viewer. If regulations are strictly enforced, and mathematical accuracy be insisted upon, far greater skill will be necessary in the workman, and the price of the work must be enhanced in proportion. When a man finds his work rejected, and incurs a serious loss for some deviation so slight, that, for all practical purposes, it is immaterial, he will naturally hesitate to continue in a business where his week's earnings depend on such doubtful, and

it

it may be, capricious decisions. Unless there is a ready appeal to some superior viewer or inspector, the workman feels that he has no redress, and he may even fear to complain, since his complaint may occasion future ill will towards himself. 4061.

"When, again, contractors find their work rejected, they should not, it is said, be obliged to appeal to the Board of Ordnance, whose members cannot be practically conversant with such details; but if, in important cases, competent persons could be named by the Ordnance, 4137. who could review the matter conjointly with the inspector, it is said that the contractors would feel confidence in such decisions, and inferior workmanship would be equally excluded.

"This subject appears to be well deserving the attention of the Ordnance.

"Mr. Brazier, a manufacturer of gun-locks, produced to Your Committee a lock of his manufacture, which had been rejected by the Government viewer, but which he considered to be not only exact in regard to pattern, but moreover, of such excellent workmanship, that he sent it, amongst others, to the Exhibition of 1851. 3955.

"The view during the last year is not, however, complained of.

"Another source of delay is said to have been occasioned by difficulty in procuring, and 4121. even in seeing, the pattern of the article to be manufactured.

It appears that, although there may be many contractors for the same article, only one pattern of that article is sent; so that, while it may be retained by one contractor, the others 4874. are necessarily delayed. In other cases, after the contract has been entered into, a con- 5258. siderable interval has elapsed before the pattern has been furnished; and instances are adduced where, after a pattern has been sent, alterations have been adopted, and the articles 3771. made according to pattern refused.

"The regulations respecting patterns are apparently capable of improvement.

"Another measure might be adopted, which it is said would greatly tend to expedite the supply of muskets. Some witnesses have recommended that a contract should be entered into for the musket complete, in lieu of the present numerous contracts for the separate parts. This course is recommended by Mr. Whitworth, who is an impartial witness in this 2138. matter; he says that the present mode of contracting is absurd. 2140.

"All the witnesses who are connected with the gun trade concur in recommending that in regard to the smaller articles, 14 or more in number, which are now supplied to the setters-up from the Government store, the system should be altered, and the setters-up should in future be required to procure them. This is the practice of the East India Company. 6404.

"Other errors and inadvertencies on the part of the Government officers will be found in the evidence, which are stated to have occasioned delay. One instance is an error in the 5445. sights, which originated from a mistake on the part of the late inspector of small arms.

"Your Committee have now pointed out the chief causes of delay which have been adduced by the manufacturers; the avoidance of these for the future would, it is stated, expedite the supply.

"In recommending that a system of contracting for the supply of muskets should be tried, they would suggest that attention should not only be given to these details, but that disinterested men who are practically acquainted with the gun trade, should be consulted, from whom many valuable hints might be obtained.

"Your Committee would further observe, that if the Board of Ordnance earnestly desire to continue the system of providing arms by contract, and wish to expedite the supply, it is most important that such steps should be taken as will give a confidence to the trade that there is a sincere intention of fairly trying the system of contract. With this object, Your Committee recommend that contracts should only be entered into with such men as have means and capital to fulfil their engagements; that in future, the contract should be understood to commence from the time of the delivery of the pattern; that the regulations as to the view should be reconsidered; and that in all cases of doubt on the part of the viewer, or remonstrance on the part of the contractor, a ready appeal to a competent person should be afforded.

"While Your Committee recommend that muskets should be mainly provided by contract, they are nevertheless of opinion that the Government may with advantage adopt means for trying the more extensive application of machinery to the manufacture of muskets, for the purpose of experiment, and as an example to the trade.

"It is desirable that this trial should be made on a limited scale, since it is manifest that if the Board of Ordnance were to construct a factory on the extensive plan originally proposed to Parliament, the manufacturers would naturally foresee that, in lieu of a continuous demand, their employment as contractors must soon cease, and they would thus be discouraged from making those exertions by which the supply of muskets may be best expedited.

"The country would thus lose the advantage of the skill, capital, and enterprise of private traders at a time when their assistance is needed, and the further experiment of providing arms by contract would not, in the opinion of Your Committee, be fairly tried.

"The establishment at Enfield is now, it is said, capable of producing from 15,000 to 4933. 20,000 muskets a year. The production of this quantity appears to Your Committee ample for the purpose of testing the proposed plan; if, therefore, a new factory is to be constructed, Your Committee recommend that it should be adapted to the production of a similar amount, and not upon a larger scale.

"In order that Parliament may have the means of ascertaining the success of the Government factory for the construction of muskets, Your Committee recommend that a debtor and creditor account should be kept of this separate establishment, so that the whole profit or loss may be fairly shown."

Motion made, and Question proposed, "That the Draft Report of the Chairman be read 2°, paragraph by paragraph." Amendment proposed, to leave out the words "The Chairman," and insert the words "Lord Seymour," instead thereof. Question put, "That the words 'The Chairman' stand part of the Question." The Committee divided:

Ayes, 3.	Noes, 8.
Mr. Monsell.	Mr. Walpole.
Colonel Lindsay.	Mr. Muntz.
Mr. George Dundas.	Mr. Newdegate.
	Lord Seymour.
	Colonel Boldero.
	Colonel Dunne.
	Mr. Geach.
	Lord Paget.

Words added—Main Question, as amended, put, and agreed to.

Draft Report of Lord Seymour read 2°, paragraph by paragraph.

Several amendments made.

Amendment proposed in page 3, first paragraph, after the word "he," to leave out the words "knows nothing about a musket, but" in order to add the words, "is not practically acquainted with the manufacture of muskets, but as a mechanician," (Lord *Seymour*). Question put, "That the words proposed to be left out stand part of the Question." The Committee divided:

Ayes, 3.	Noes, 8.
Mr. Monsell.	Mr. Walpole.
Colonel Lindsay.	Mr. Muntz.
Mr. Dundas.	Mr. Newdegate.
	Lord Seymour.
	Colonel Boldero.
	Colonel Dunne.
	Mr. Geach.
	Lord Paget.

Words added.

Another amendment proposed at the end of the paragraph, to add the words, "he explained his meaning however, by stating, that although he knew nothing about the comparative merits of the different sorts of guns, he saw the thing to be produced, and tried to find out the quickest and best way of doing it, and nothing more," (Mr. *Monsell*). Question put, "That those words be there added." The Committee divided:

Ayes, 4.	Noes, 7.
Colonel Boldero.	Mr. Walpole.
Mr. Monsell.	Mr. Muntz.
Colonel Lindsay.	Mr. Newdegate.
Mr. George Dundas.	Lord Seymour.
	Colonel Dunne.
	Mr. Geach.
	Lord Paget.

Paragraph, as amended, agreed to.

Several other paragraphs, read, amended, and agreed to.

[Adjourned till Wednesday, at Twelve o'clock.

Mercurii, 10° *die Maii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Walpole.	Colonel Dunne.
Mr. Muntz.	Mr. Geach.
Mr. Newdegate.	Colonel Lindsay.
Lord Seymour.	Mr. Goerge Dundas.
Colonel Boldero.	Lord Paget.
Mr. Monsell.	

Draft Report further considered.

Last paragraph in page 3, read, and postponed.

Amendment

Amendment proposed in page 4, paragraph 5, in the third line, after the word "been," to insert the word "successfully," (Mr. *G. Dundas*). Question put, "That the word, 'successfully' be there inserted." The Committee divided:

Ayes, 3.	Noes, 8.
Mr. Monsell.	Mr. Walpole.
Colonel Lindsay.	Mr. Muntz.
Mr. George Dundas.	Mr. Newdegate.
	Lord Seymour.
	Colonel Boldero.
	Colonel Dunne.
	Mr. Geach.
	Lord Paget.

Paragraph postponed.

Page 5, paragraphs 7, 8, and 9, read, and postponed.

Amendment proposed in page 7, at the end of the eighth paragraph, to add the following words: "Your Committee would here observe, that the complaint of the contractors, that the orders of the Government for Small Arms have not been continuous, raises a question of great importance. There is no doubt that a large demand for Small Arms, spread over a number of years, would attract to the gun trade a supply of hands sufficient to meet the demand. Even in the first year considerable additional supplies might by this means be attained, and in each successive year the increase would be augmented. On the other hand, it has been observed that it would not be judicious on the part of the Board of Ordnance to pledge themselves to large and continuous orders, for in this age of rapid invention, such a course might be attended with very inconvenient consequences. For instance, the pattern of 1853 has been substituted for that of 1851; therefore, if large orders for the pattern of 1851 existed, they would be orders for a now obsolete arm. Some new pattern may soon supply the place of that which is now ordered." (Colonel *Dunne*). Question put, "That those words be there added." The Committee divided:

Ayes, 6.	Noes, 5.
Mr. Walpole.	Mr. Muntz.
Colonel Boldero.	Mr. Newdegate.
Mr. Monsell.	Lord Seymour.
Colonel Dunne.	Mr. Geach.
Colonel Lindsay.	Lord Paget.
Mr. George Dundas.	

Several other Amendments made.

The following paragraph read: "The establishment at Enfield, is now, it is said, capable of producing from 15,000 to 20,000 muskets a year. The production of this quantity appears to Your Committee ample for the purpose of testing the proposed plan; if, therefore, a new factory is to be constructed, Your Committee recommend that it should be adapted to the production of a similar amount, and not upon a larger scale." Question, "That the paragraph stand part of the proposed Report," put, and negatived.

The following paragraph was proposed instead thereof (Mr. *Newdegate*): "Your Committee, therefore, recommend that the Government manufactory at Enfield should be continued, since it appears to them, not only from the evidence, but from information afforded by several Members of the Committee, who have inspected the Enfield establishment, that it is well adapted, and can be made available for the execution of the plan which Your Committee have recommended, and that it is capable of any extension that can be required at far less cost, and with much less delay, than would be inevitable in the construction of a new establishment." Question put, "That this paragraph be added to the proposed Report." The Committee divided:

Ayes, 6.	Noes, 5.
Mr. Muntz.	Mr. Walpole.
Mr. Newdegate.	Mr. Monsell.
Lord Seymour.	Colonel Dunne.
Colonel Boldero.	Colonel Lindsay.
Mr. Geach.	Mr. George Dundas.
Lord Paget.	

[Adjourned till Friday, at Two o'clock.

Veneris, 12° *die Maii*, 1854.

MEMBERS PRESENT:

Sir WILLIAM MOLESWORTH, in the Chair.

Mr. Muntz.	Mr. Monsell.
Mr. Newdegate.	Mr. Geach.
Lord Seymour.	Mr. George Dundas.
Colonel Boldero.	

Draft Report further considered.

Postponed paragraphs, read, amended, and agreed to.

Other Amendments made.

Question, "That this be the Report of the Committee," put, and agreed to.

Ordered, to Report, together with the Minutes of Evidence.

EXPENSES OF WITNESSES.

NAME of WITNESS.	Profession or Condition.	By what Member of Committee Motion made for Attendance of the Witness.	Date of Arrival.	Date of Discharge.	Total Number of Days in London.	Number of Days under Examination by Committee, or acting specially under their Orders.	Expenses of Journey to London and back.	Expenses in London.	TOTAL Expenses allowed to Witness.
							£. s. d.	£. s. d.	£. s. d.
George Wallis	Schoolmaster	Mr. Monsell	15 Mar.	17 Mar.	3	1	3 3 –	3 3 –	6 3 –
Joseph Whitworth	Engineer	ditto	17 „	21 „	5	1	4 11 –	15 15 –	20 6 –
Henry Vanwart	Merchant	Mr. Muntz	22 „	24 „	2	1	2 2 –	2 2 –	4 4 –
John Goodman	ditto	ditto	22 „	24 „	2	1	2 2 –	2 2 –	4 4 –
								£.	34 17 –

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MINUTES OF EVIDENCE.

Veneris, 10° *die Martii*, 1854.

MEMBERS PRESENT.

Sir William Molesworth.	Lord Seymour.
Colonel Maule.	Mr. Monsell.
Mr. Muntz.	Lord Paget.
Colonel Boldero.	Mr. Geach.
Colonel Lindsay.	Colonel Dunne.
Mr. Newdegate.	Mr. Walpole.
Mr. George Dundas.	

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Captain Sir *Thomas Hastings*, R. N., C.B., called in; and Examined.

Captain Sir *T. Hastings*, R. N., C. B.

10 March 1854.

1. *Chairman.*] YOU are an officer of the Royal Navy?—I am.
2. How long have you been in the Royal Navy?—Fifty-one years.
3. Have you been employed in conducting any particular department of the navy?—I was for nearly 14 years in command of the gunnery establishment on board the "Excellent," and superintendent of the Naval College; the gunnery establishment embraces a consideration of all the arms, great and small, used for the navy; their application, and instruction in their use.
4. How long have you been in the Ordnance Department?—Since July 1845.
5. What position do you occupy in that department?—I am a member of the Board of Ordnance, and Comptroller of Stores, and principal storekeeper.
6. From your position in that department have you had the general inspection of the small arms, and the provision of small arms for the ships in the navy?—Yes.
7. Have you in consequence been in communication with contractors and others engaged generally in the gun trade?—Yes.
8. Is there a new arm about to be introduced into the service?—Yes, it was decided on by the late Duke of Wellington and the Marquis of Anglesea, as the only arm to be used throughout the service.
9. When was that decision come to?—In 1851.
10. Mr. *Monsell.*] That arm is not precisely the arm which is now going to be provided, is it?—No; I may add that it has been since modified by Lord Hardinge, when Master-general in 1852.
11. *Chairman.*] Can you state to the Committee what number of that arm should be provided as speedily as possible?—For the Line it would be 150,000; taking the number that it would be necessary to supply the Artillery, 14,000; the Militia, 100,000 at least; Pensioners, 16,000; Coast Guard, 14,000; Marines, 12,000; Navy, 30,000; Channel Islands Militia, 6,000; and the Colonial Corps, 5,000. Then, on an estimate made by Sir Henry Hardinge and the Duke of Wellington, when he was Master-general of the Ordnance, and Lord Hardinge, the Clerk of the Ordnance, it would appear that there should be in

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store continually 450,000 stand of arms for the home service, and then the number of arms required in the colonies would amount to about 150,000 more.

12. Mr. *Geach.*] Do you mean to be kept in store in the colonies?—No; from information we have received, we think it probable that a large number of arms will be required for the militia of the colonies, which is likely to be increased considerably in numbers.

13. *Chairman.*] What is the total number to be supplied separately and speedily?—The total number, adding up those items, would be upwards of 900,000.

14. Lord *Seymour.*] Does that include the store?—Everything.

15. After that number has been provided, what number would be annually required to supply the place of those that were worn out?—It is arranged that the arms shall be considered condemnable at the end of 12 years, and if we take this number of arms as actually in use, it may be assumed that there would be 30,000 (the paper before me gives 337,000) per annum after the supply had once been made. I have made that calculation, not on the store arms, but on the arms in use.

16. What do you estimate will be the cost of those arms which are about to be introduced into the service at the present contract price?—£. 3. 9 *s.* – ¼ *d.* is the present contract. The cost of the Enfield is 3 *l.* 4 *s.* 7 ½ *d.*, the cost of plant in both cases being added.

17. Colonel *Dunne.*] Is that for the Enfield rifle?—They are both the same.

18. Colonel *Lindsay.*] What was the price at Enfield?—£. 3. 4 *s.* 7 ½ *d.*

19. Colonel *Dunne.*] They are both rifles, are they not?—They are both identical, made to the same pattern.

20. *Chairman.*] Will you describe to the Committee the system which is pursued by the Ordnance in the provision of fire-arms?—It is done by contract and competition. I have a paper here which I think will describe that to the Committee. This is the provision of rifle muskets, pattern of 1851. Twenty-eight thousand barrels were to be provided on a requisition made, on the decision of the Duke of Wellington and Lord Anglesea, on the 27th of May 1851. On the 27th of May tenders for the supply were received.

21. Colonel *Maule.*] This is the system by contract, is it not?—Yes; contracts were entered into by Messrs. E. Millward, Beasley & Co., Deakin & Son, H. Clive, William Millward, J. Clive, and Turner & Son.

22. For barrels only?—Yes. All the materials are in the first instance provided, barrels, locks, rammers, all the component parts of the musket, and the stock; and when those materials are provided and in store, sufficiently to place in the hands of another set of men called the setters up, the Board delivers all those articles which have been previously examined, approved of, and marked, to the setters up, and having those materials they proceed to give you a perfect musket.

23. How many separate contracts are there for a single musket?—There is a contract for the barrel, and every part is separate; for example, there are barrels, bayonets, locks, rammers, the brass for the heel plate, and the guards and slings, and then the pins by which all those things are set in together.

24. Is each of these a separate contract?—Yes.

25. In 1851, what was the number contracted for?—Twenty-eight thousand.

26. Were they the Enfield pattern, or the Minié?—The Minié. The price uniformly tendered by all for barrels was just the same, namely, 3 *s.* 9 *d.* in a rolled state, and 11 *s.* in a filed state; the cost of the barrels in the rolled state was reported as being high; and I should explain that the barrels in the rolled state were intended for Enfield at 3 *s.* 9 *d.*, to be brought into the filed state at 11 *s.*

27. *Chairman.*] What is the difference between the two?—In the one case the barrel is supplied, merely rolled by the mills, with a lump upon it not shaped at all for the percussion hammer to strike upon, and not pierced through for a communication with the charge by the nipple, but the difference in price is caused by bringing the barrel into the filed state.

28. Mr. *Muntz.*] Are they twisted barrels?—No; the price of the barrels in the rolled state was reported to be high, and the time in which those were agreed to be delivered was 37 weeks. In February 1852, they were to be delivered, but they were not delivered till the 30th of June 1852; they ought to have

have been delivered in the month of February 1852, and the reason urged by the contractor was the very rigid inspection of the viewers.

29. *Chairman.*] In what way did that rigid inspection of the viewers prevent the barrels being delivered?—Every article is viewed; and this particular case was investigated when Lord Hardinge was Master-general of the Ordnance. On that occasion the Honourable Member for Birmingham and the Honourable Member for North Warwickshire were present, and it ended by Lord Hardinge deciding that there was no ground for the charge brought against the inspector of small arms; and I may add, that if the Committee refer to the Report of the Committee of which the Noble Member for Totnes was Chairman in 1849, to the examination of Mr. Lovell, Mr. Serjeant, and Mr. Wheeler, they will find that they state that they had no reason in their long intercourse with the Board of Ordnance to complain of any unfairness in the view; they stated that the same complaints were made against their own viewers, and they thought that it originated materially in the discontented minds of the workmen, and that such would be the case whenever you placed one man to overlook the work of another. If the decision was adverse to that man he would consider that he had cause of complaint, and speak of the man being litigious. There is a report from the assistant inspector of small arms, on the 11th of February 1851, and it appears that the materials sufficient to commence setting up were not collected till December 1851: "The rejections are more numerous, not from rigid inspection and view, as the assistant inspector of small arms states, but Mr. Marshall, who supplies all the contractors with barrel iron except Messrs. Beasley, not having succeeded in supplying barrel iron sufficiently clear, and because the barrel makers have employed workmen accustomed to the manufacture of barrels of an inferior quality and price upon a superior article, which without practice he is unable to do, and thereby entails serious loss upon his master." And the Select Committee in 1849, in their Second Report, expressed their opinion that "the objections which have been urged against the present rigid inspection do not appear to rest on any valid grounds."

30. Is the system there described still pursued in procuring muskets and other fire-arms?—Yes, the inspection is still pursued.

31. Do you think that the system pursued in procuring fire-arms is a satisfactory one?—I think it is satisfactory as far as regards inspection and manual labour; but if the question means whether I am satisfied with the present system, I think that the failure of the contracts of 1851 and 1853, of which I was going to give the Committee an account, compel me to say that I do not now consider the system satisfactory.

32. Will you state why you consider the present system not satisfactory?—I have already stated that in the contract of 1851, which ought to have been fulfilled in February 1852, the materials were not delivered till June 1852, and the contract for the supply of 20,000 rifle muskets was not performed in the time promised. Though it was promised, in October 1853, that the contract for 20,000 should be furnished in a fixed proportion, we have not yet obtained a sufficient number to commence setting up those arms.

33. Did the contractors assign any reasons for not keeping their engagements?—They gave various reasons; for instance, that there were strikes amongst their workmen; now I do not consider the system unsatisfactory on that account only, but I think there is a want of cheapness in the furnishing the muskets.

34. In what respect?—The present system is not cheap, because a great part of the work is performed by hand labour which might be performed by machinery.

35. You consider the present system to be neither cheap nor efficient?—Yes; and I will give the Committee my reasons for thinking so. In that part of the manufacture in which machinery has been introduced more perfectly, namely, the rolling of the barrels, a combination exists amongst the persons possessing such machinery, who have at times demanded prices which were inadmissible. Although the supply of barrels required in 1853 was advertised in July 1853, we received (I speak especially of barrels now) the tenders of seven persons, all tendering the same price; we had to ascertain whether we could obtain this article cheaper, and we advertised throughout the United Kingdom, endeavouring

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endeavouring to promulgate the notice through England, Scotland, and Ireland, but not a single offer was made from any other manufacturer.

36. Were all the tenders at exactly the same price?—Yes, for the barrel; the first tender in the usual way to Birmingham was in July, and the general tender throughout the kingdom was in August of the same year, 1853.

37. Mr. *Newdegate.*] For what number was that?—Twenty thousand; when it was found that those high prices were still adhered to it was thought well that, as controlling that particular branch in the Ordnance, I should proceed to Birmingham.

38. *Chairman.*] Will you state the price at which they were tendered for?—14 *s.* a barrel.

39. Did you consider that price exorbitant?—I take it that we shall see that by the details showing the value of iron as we go along, but I do consider that the makers of barrels have been making 25 per cent. profit, which is a large profit.

40. In consequence of the high price of those tenders you proceeded to Birmingham; what did you do there?—When I proceeded to Birmingham I had a discussion with those gentlemen on the subject.

41. To what gentlemen do you refer?—The barrel-rollers whom I named just now; Mr. William Millward, Messrs. Beasley & Farmer, Mr. Ezra Millward, Messrs. Deakin & Son, Mr. John Clive, Mr. Henry Clive, and Messrs. S. Turner & Sons, and after explaining to them the state of things, and pointing out to them that the price was considered a high one, and that it would be impossible that we could accept a price so high as that, I then stated to them that it was clear that I could enter into no definite engagement with them; still it was obvious, in consequence of the resolution to change the weapon of the army generally, that a very large portion of work would be continuously wanted. I said, "I tell you this, gentlemen, not officially, as it is open to everybody; that a decision has been made to change the arm, and the consequence must be what I have just stated. I wish you to understand that I only wish to clear the way for our making a contract." At the end of this discussion with the barrel makers, they consented to reduce the price to 13 *s.*, and to furnish the arms in fixed proportions after a given period; the barrel makers then lowered their price, as I said, to 13 *s.*, and they promised that they would carry out the contract which they had entered into without fail; that was on the 3d of October 1853, the last time I was at Birmingham. Now, in March, we have not yet had a sufficient number of those barrels delivered in to commence setting up the 20,000 muskets.

42. How many barrels have you had delivered in?—1820.

43. How many ought to have been delivered in?—I should say that we ought by this time to have had delivered 7,000.

44. What were the terms of the agreement with regard to the delivery?—I hold in my hand a return of the articles which have been delivered by the contractors within the period agreed for during the four weeks from the 31st of January to the 28th February 1854. The number deficient in a week was 37 in Mr. Millward's; in Messrs. Beasley's and Farmer's, 174; in Mr. John Clive's, 87; Mr. Henry Clive's, 119; I made a contract that those were to be delivered.

45. You are speaking of the contract made in the autumn of 1853?—Yes.

46. Will you state what was the number, and the period of delivery according to the terms of the contract?—They were to be delivered in this way; 50 per week for the first four weeks.

47. How many contractors were there?—Seven contractors.

48. Did they deliver 50 muskets per week?—For the first four weeks they were to deliver 50.

49. Lord *Seymour.*] Was it 50 for each contractor?—Yes, and then 75 each per week for the next four weeks, and 100 per week each afterwards until the completion, the first delivery to be made in six weeks from the date of the order.

50. At the end of the first six weeks 350 muskets ought to have been delivered?—Yes.

51. How many were delivered?—I do not think I can state that exactly. Here is a letter from Messrs. Turner, in which they state, "In reply to yours of the 14th instant, we beg most respectfully to state the reason we have not done our quantity of rifle musket-barrels, as we have had a breakage with our mill. We will do our quantity next month, and likewise the arrears which we

are

are short this month, hoping the Honourable Board will excuse the delay, which we could not avoid."

52. Mr. *Geach.*] On the 25th of November I think you will find that the first delivery was due?—On the 7th of January 1854, 1,050 barrels ought to have been delivered.

53. Are the Committee to understand that up to the 7th of January everything was delivered regularly?—No; for on the 7th of January, I have a return showing on that day how the contracts stood.

54. *Chairman.*] On the 7th of January what number of barrels were due?—1,050.

55. How many were supplied?—625, and the deficiency was 425.

56. What was the reason of that deficiency?—The parties have written various letters, which I can put in, and on an official document before me there is this memorandum made by the Board, "Ordered, that the several parties who are in arrear be acquainted with the articles reported to have been deficient on the 7th instant on the numbers which ought, according to the extended time granted to them, to have been delivered by that time; and that they be desired to explain why they have failed in their engagements, and when they will bring up the arrear, and complete the numbers due from them."

57. You state that on the 7th of January 1854, 1,050 barrels ought to have been delivered, and that only 625 barrels were delivered, leaving a deficit of 425 barrels; what were the reasons assigned for that deficiency?—The various reasons are stated in the letters of the contractors. One is, that the mill was broken, and another, that his workmen had left him, and a variety of other causes; but the letters I will read, if the Committee will permit me. This is a letter from Mr. Henry Clive, who was one of the barrel makers. "In answer to your communication of the 14th instant, I beg most respectfully to state that my non-fulfilment of your contract for last month, as per agreement, arose from two causes: the first was, not being able to make the arrangement with my men so soon as I had anticipated, which I am happy to say I have now done, and last week I passed my number to account. I was also prevented, after I had arranged with my men, by the frost and want of coal. I am now at regular work, and have no doubt by the end of March to make up any deficiency that may now exist." The next is from Mr. John Clive, dated the 17th of January 1854. "Sir, In answer to your inquiry respecting the delay with Order $\frac{0}{411}$, for 'Barrels, New Rifle Musket,' I beg to inform you that it was occasioned by the continued strike of our workmen. Allow me to add, that a satisfactory arrangement having been made them, they are now at work. I passed 54 barrels at view last week, and hope to send near 100 more to view this week, and have every reason to expect I shall very soon be able to make up the arrears." Here is another letter from Messrs. Beasley & Farmer, dated the 17th of January 1854, in which they state, "In reply to your favour of the 14th instant, we beg to inform the Honourable Board we have sent in a lot of 60 new rifle musket barrels last Wednesday, and we are glad to find the principal part were received to account. We shall send in a further quantity to-morrow, and we trust most will be passed. We shall continue to send in a weekly supply, and trust to be enabled to give satisfaction. The delay has been caused by a strike of our workmen, who, we are now glad to state, have returned to their employment."

58. These are all with regard to the barrels due the 7th of January?—Yes. This is a letter from Mr. Ezra Millward, another barrel roller. "In reply to your letter of the 14th instant, I am sorry to say the deficiency of the barrels agreed to be delivered by me has been occasioned by my men, the grinders and filers, turning out for price, but am happy to say they have all returned to work again, and hope now to send a sufficient supply to make up my complement, and more if required."

59. Can you state whether any one of the seven performed his contract?—I think not; Mr. Gunner, who is the inspector of small arms, tells me that none of them delivered their full number.

60. What is the date of the last return?—The 31st of January.

61. On the 31st of January how many ought to have been delivered?—I cannot give the Committee that; I can only give the numbers deficient in that week's delivery. Mr. Millward was 37 deficient.

62. Lord *Seymour.*] Upon one particular contract?—Yes.

 63. *Chairman.*]

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63. *Chairman.*] How many ought he to have delivered?—Two hundred and fifty, and he delivered 213.

64. In that number that had not been delivered, do you include the number that had been rejected on viewing?—I take it that they would not appear. If they are finally rejected they do not appear; but one column in a paper which I have before me, will give the Committee some idea of the comparative state of those things. On the 31st of January 1854, the fines at 1 *s.* each barrel due from Millward were 1 *l.* 17 *s.*; those due from Beasley's and Farmer were 8 *l.* 14 *s.*

65. What is the penalty?—One shilling for each barrel not being received.

66. Lord *Seymour.*] You do not call it delivered unless you approve of it?—Decidedly not.

67. *Chairman.*] There is a penalty of 1 *s.* on each barrel that has not been received?—Which has not been delivered and accepted.

68. Can you tell what proportion of them had been rejected?—No.

69. Colonel *Boldero.*] Where were the 20,000 to be delivered?—At Birmingham; to the manufactory there.

70. For the Birmingham people to set up, or for the Ordnance to set up?—We were obtaining materials to give out to be set up at Birmingham.

71. Colonel *Lindsay.*] Does the rejection of them take place at Birmingham?—Yes.

72. Mr. *Geach.*] Are those barrels to which you have been alluding rifle barrels?—The barrel is not rifled till the arm is set up; they are barrels for rifling.

73. Mr. *G. Dundas.*] For the use of the line?—Yes.

74. Is it the two-groved rifle?—No; this is the new Minié mode of rifling applied to an ordinary barrel, which is rolled in the usual way, bored out, and then, when set up, it is rifled; if the Committee will allow me, I will hand in the agreements made by the parties. (*The same were handed in.*)

Vide Appendix.

75. *Chairman.*] Have you any other statement to make with regard to the failure of the contractors in fulfilling their contracts?—The bayonet makers have failed, and the lock makers have failed.

76. Can you give the particulars of the failure of each, beginning with the lock makers?—I have a letter, dated the 17th January 1854, from Mr. Samuel Saunders, in which he states, "Your letter of the 14th instant has come to hand. I expected that the 76 locks of the first pattern, which was passed the last month, would have been counted to the 53 of the last pattern, which would have made them 129. If they are not to be counted to the last pattern, I could make them up during the next two months."

77. Can you state how many locks were contracted for?—Twenty thousand.

78. When was the contract made?—At the same time, on the 6th of October.

79. What were the terms of the contract?—"20,000 locks with swivels, in filed state, at 8 *s.* 3 *d.* each. To be delivered into store at Birmingham. The party tendering to state the number per week he will engage to deliver, and the period when he will make the first delivery. It is probable that further supplies will eventually be required to a considerable extent." Now, when I was present at Birmingham I met these gentlemen; I had a considerable discussion with them, and some of them reduced their prices, and I then stated to them that this arm was wanted urgently; and I also added that if the same delays occurred in setting up this arm which had occurred in the others, it would compel the Government probably to purchase abroad, or to make some other arrangement than that of dealing at Birmingham. They stated that they were quite sensible that the arms were wanted, and they very explicitly promised that they should be furnished without difficulty or delay.

80. Will you just state the terms of the contract?—That they were to supply those 20,000 locks amongst them. Partridge's offer was at 8 *s.* per lock, Corbett at 8 *s.*, Aston at 8 *s.*, Francis at 8 *s.*, Duce at 8 *s.* 3 *d.*, Sanders at 8 *s.* 4 *d.*, Carbett at 9 *s.* 1 *d.*, and Brazier & Son at 9 *s.* 3 *d.*

81. How many contractors were there?—Eight.

82. Did you agree to those terms?—Not entirely.

83. What were the terms which you made with those contractors?—They agreed to "supply a portion or all the above locks, deliveries to commence in one month, at the rate of 50 per week for the first month, 75 per week for the second

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second month, and 125 per week for any length of time afterwards, provided the order is not less than 5,000; no higher price to be given to another party." That was Partridge's agreement. Then Corbett agrees for the same terms, and also makes a stipulation that no higher price is to be given to another party than 8 *s.* Then Aston makes the same stipulation that no higher price is to be given, and that the delivery is to commence in one month; that is, in a month from he date of the contract he is to make his first delivery.

84. And to deliver the same number as the others?—Yes; Francis agrees in the same manner as to the way in which they are to be delivered, on the condition that no higher price is given, and the delivery to commence after a month. Then Duce makes no statement, and finally we arranged the prices to be, I think, 8 *s.* 3 *d.* throughout the whole, and that they were to be delivered as before stated.

85. You had better make a return of each part of the arm, the barrel, lock, &c., stating what the delivery ought to have been, and what the delivery was?—I will furnish it to the Committee.

86. Colonel *Lindsay*.] Can you state to the Committee the deficiency in the on the 17th of January?—The total number accepted were 755, and the total number deficient were 630, that is 1,385 ought to have been delivered.

87. Mr. *Monsell*.] Can you explain the reason of the great difficulty that there is in getting a sufficient number of military gun makers together to set up arms, and to make the different parts of arms at any time that they are required by the Board of Ordnance?—I can give the Committee a general view of the state of these two last contracts, and show, as I before stated, that the present mode is not so cheap a mode as might be adopted; and that when called upon to furnish materials in the two last contracts, the moment the tenders for material had been put out, there had been strikes amongst the workmen, and other obstacles which had prevented the completion in the time when they should have furnished the articles for setting up the arms. When the materials in 1851 were furnished the things went into the hands of the setters-up, and when there a similar strike took place, and we were applied to by the gentlemen who had taken the contracts to give them more time in consequence of those disagreements with their workmen, and the contract of 1851 was not completed by 10 months, I think, after the time at which it should have been completed, and when we entered again on that of 1853, a similar difficulty arose in obtaining materials, and they are not yet furnished. We have made contracts with the setters-up, but it will still be some time before we can set them to work for want of materials.

88. Although there are a considerable number of setters-up in London as well as in Birmingham, is it the fact that the materials are altogether made in Birmingham and its neighbourhood?—Yes.

89. Therefore we must wholly depend for the supply of materials upon Birmingham and its neighbourhood?—Clearly.

90. Will you explain why it is the gun trade of this country, being so large, there being so large a number of persons employed in it, and such a large export of arms from this to other countries, there is a difficulty in getting together a sufficient number of gunmakers for setting up arms for the Board of Ordnance?—First of all, it must be understood that the materials are nearly all provided in Birmingham and its neighbourhood. Mr. Clive and the other gentlemen with the rolling machinery, I suppose, are capable of rolling 300,000 barrels in a year; therefore, I conclude that the reason why the Government cannot obtain arms, is that those gentlemen find more remunerative occupation for their machinery; and I suppose also, when these difficulties arise in reference to other materials, that the same cause prevents the supply being furnished to the Government. The gun makers are divided, after we come to the setting up, into three classes; one class for making superior arms, fowling-pieces, and so forth; next, the persons who stand as skilled workmen on the scale are military gun makers, and then there are gun makers who make a very inferior sort of arm, I believe even as low as 10 *s.* a stand, and I have no doubt that if that class of men be counted upon you might make, perhaps, 4,000 or 5,000 stand of arms in a week. But that is an arm of a very inferior class, and a man so employed is not competent to do the work of a military gun maker; and I consider that the present arms which are demanded are of a superior order to the

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the arm which has hitherto been demanded from the trade. The Line musket of 1842 is a good arm, and requires pretty nearly as skilled a workman as the arm of 1851 or 1853; but the extra service arm, and the sea service arm, are arms of an inferior sort, of which the Government had a large quantity of materials in store, and to set them up I look upon it that we must have drawn from the inferior workmen a large proportion of men, who cannot now be called upon to work upon the improved ones; and the statement which I have now made is corroborated by the statement of Mr. Sargent and Mr. Wheeler in 1849, and by the opinion of Mr. Lovell, who was the inspector of small arms, and who has reported these facts; I consider that these are mainly the reasons why you cannot get a sufficient supply of arms of the superior sort.

91. You stated, did you not, that the general demand is either for a superior class of arms, or for a very inferior class to that which is required for Her Majesty's service; and that the workmen for the superior work are too expensive, and the workmen for the lower class of work are not experienced enough to make the arms required by the Board of Ordnance?—The first class cannot be paid by the Government in the ratio in which they are paid by the superior branch of the trade, and the others who make an inferior arm are not sufficiently skilled to be employed in making the new musket.

92. And the result is, that after having used the best exertions in your power, you were not able, without considerable delays, to procure 23,000 arms in 1851, and 20,000 in 1853 within a reasonable time?—Precisely so; and the contract of 1851 was, I think, not fulfilled for ten months after the period in which it ought to have been fulfilled.

93. From your long experience with regard to the requirements of this country as to arms, do you consider it safe that we should remain in our present state?—I have considered it far from being safe.

94. Do you, in making that statement, express not only your own opinion, but that of Lord Raglan and your colleagues in the Board of Ordnance?—Quite so.

95. Lord *Seymour*.] You were examined before the Committee in 1849 on Army and Ordnance?—Yes; but I was not examined on the subject of small arms.

96. But you had then, as now, the general superintendence of the supply of small arms?—Precisely; that is, of the supply.

97. You have just stated that it was in 1842 that a superior musket was required for the army?—No, I mean that a superior musket was required on the introduction of the Minié principle, subsequently to the decision given by Duke of Wellington and Lord Anglesea.

98. You did not mean to say that in 1842 a superior musket had been required?—I stated that it was a superior arm.

99. You stated, did you not, that in 1842 a superior sort of musket was required?—No, it is a superior arm, but I did not mean to convey that impression; I meant to state that the musket of 1842 was a superior arm, and that certain other arms of an inferior character were set up also about the same time.

100. In 1842 a superior musket having been introduced, was that a musket that the Ordnance required?—No, not alone; it was a superior musket, but there were other two muskets, the extra service and the sea service.

101. There were a certain number of a superior class of muskets required in 1842?—Yes.

102. Then in 1849 the inspector of small arms, Mr. Lovell, came before the Committee of this House?—Yes.

103. In 1849, then, the Ordnance had had five years' experience after a superior sort of musket had been required?—Yes.

104. Mr. Lovell stated in 1849 that he considered it not desirable to manufacture muskets by the Ordnance as a mode of supply; do you remember that?—I have seen it in his evidence.

105. Then having having had experience for five years of the sort of superior musket that was then required, he had for five years found that the trade was competent to supply it?—It was competent to supply the Line pattern musket of 1842, and the proportion of the extra service muskets made up from inferior materials, and the sea service musket made up from inferior materials, which did

did not require such skilled workmen as the Minié pattern of 1851 and 1853 requires.

106. Have you considered that the reason why we are to abandon the contract system and adopt the manufacturing system is because of the alteration that has taken place between the musket of 1842 and the musket of 1853?—No; I consider that the reason why it is advisable to abandon the system of contract and to institute manufacture by the Government, is simply because we have not been able to obtain the fulfilment of the contracts of 1851 or 1853; nor do I see from the state of the gun trade that it is likely that we should have a sufficient number of skilled workmen to furnish annually the number of arms required.

107. Mr. Lovell had had, as inspector of small arms, 45 years' experience?—Yes, he had.

108. And during those 45 years' experience he had found the trade of the country able to furnish the supply which the Government required?—He does not take into consideration the fact which I wish to press on the consideration of the Committee, that the arms manufactured antecedently to 1851 were comprised of three sorts, a very good arm, the best arm then in the hands of any country, being the Line pattern musket of 1842, the extra service musket, and the sea service musket; I believe that if all the arms had been set up according to the pattern of 1842, you would not have been able to obtain them, and therefore the conclusion which I draw from that is, that it is unsafe to rest in that state.

109. That is from a notion of your own respecting what could have been done, and not from what was done; we have Mr. Lovell's own evidence to show that up to 1849 he considered the contract system the right one?—But your Lordship will permit to say, that it is one thing to make a perfect arm like the present one, requiring all skilled workmen, and another thing to fulfil a contract for arms which did not require men so highly skilled; it is not a notion of mine, but a fact, that the gun trade is divided into superior workmen for fowling pieces of a high order, military gun makers, and those who make guns for the coast of Africa for 10*s.* a gun. I do not rest upon Mr. Lovell, or upon any notion of my own, but on the fact that those two contracts have not been fulfilled, and I look of course for a reason, and I see it in the division of the gun trade of this country; if we could have obtained the materials we should have gone on months ago to set up these new arms in London, but we could not put out the additional contracts, because we could not get the materials; and it is a very serious thing for that department of the Government which is charged with holding the country in a state of readiness to meet an invasion, that they should not in one year be able to get 23,000 muskets.

110. You decided, as you state, on a particular musket in 1851?—Yes.

111. That decision was again modified, was it not, by some alteration in 1853 by Lord Hardinge?—Yes; there was an alteration of the bore, reducing its weight, but still demanding a high degree of skilfulness in the persons making it.

112. Mr. *Monsell.*] Lord Seymour has stated to you his impression of Mr. Lovell's evidence, that he said in 1849 he considered for the last 45 years the supply of arms manufactured in this country had been sufficient. Are you aware what number of stand of arms were purchased in foreign countries at the beginning of this century?—Yes, I am aware that they were purchased to a very large extent; I do not remember the number. I will read this memorandum; "In 1803, when the war with France was renewed, the scarcity of arms was so great and the want of them was so urgent, that the Government had recourse to foreign markets, and bought up all they could obtain; these were bad in quality, cumbrous and heavy in pattern, and comparatively few in number. By great exertion, and by an almost lavish expenditure, the manufacture of arms was so much increased, that the volunteers, militia, and regular forces of the kingdom were armed, and a surplus store provided, which enabled the Government of this country to aid the nations of Europe in their deliverance. It was the promptness with which supplies of arms were sent to the Peninsula, and to those parts of the Continent where the people rose in opposition to France, that gave success to their efforts, and constituted the powerful aid of this country on the spur of the moment, rather than its wealth. These arms were, however, of an inferior description, the regular army pattern having been laid

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aside for those more easily obtained (called the India pattern), and great complaints have at times been made of the bad quality of them. The urgency of the demand prevented attention to quality, and the complaints were in many instances well founded."

113. When Mr. Lovell gave that evidence to which Lord Seymour has referred, could he have contemplated the necessity of providing that very large number of arms, 900,000, which you stated, I think, has been occasioned altogether by the introduction of the Minié rifle?—Certainly not; he could not have contemplated that.

114. Lord *Seymour*.] Have you again refreshed your memory with this evidence?—No; I have not read it since 1849.

115. You are not aware whether it was stated that the Duke of Wellington considered that we ought to have 450,000 stand of arms always in store?—I dare say it was.

116. Then Mr. Lovell, whatever evidence he gave, gave it under the notion that 450,000 stand of arms were to be provided and to be kept in store for the use of the country?—I have had many conversations with Mr. Lovell on this subject, and I can state distinctly that in those conversations no question as to providing 450,000 stand of arms was ever agitated between us.

117. Mr. *Monsell*.] Was there not a considerable store of arms in the possession of the Ordnance in the year 1849?—Yes, a considerable store.

118. At all events the circumstances which have led you now to consider that so large an amount of arms must be provided did not exist at the time that Mr. Lovell gave that evidence?—I think not.

119. When Mr. Lovell spoke against the Government undertaking the manufacture of small arms, do you suppose that he had in his mind or could have had the recent discoveries that have been made with regard to the machinery for making all the different parts of a musket?—Mr. Lovell, I think, could not have contemplated machinery on the scale which is now contemplated; in a minor degree he was fully aware of the benefits of those machines introduced at Birmingham for jointing and percussioning and fitting the cocks to the locks, which had been productive of a great reduction of labour in the preparation of that particular part of the arm.

120. Mr. *G. Dundas*.] What is the meaning of percussioning?—The barrel is rolled up with a lump upon it, and that lump comes out in an oblong sort of form; the percussioning is cutting it by machinery into a proper shape for the cock to fall upon.

121. Then those barrels are not fitted with patent breeches?—No.

122. Mr. *Monsell*.] The present system having in your opinion failed, what system do you propose to substitute for it?—I should say that up to a recent period, to the failure of the contracts of 1853, I had not been friendly to a Government factory; but seeing that failure, I now think that the cheapest and most efficient way of proceeding would be to establish a Government factory, and to introduce largely into that factory the making of arms by machinery.

123. Mr. *Geach*.] For the entire construction of the gun?—Yes.

124. To be put together by machinery?—So far as may be possible.

125. With regard to the system of giving out these contracts, how do you proceed; how do you divide your contracts; you do not give the contract for the whole of the muskets to one person?—I have just stated that we go to contract, by competition, to obtain all the materials that are required for setting up the arms; and having obtained the materials, and having examined them for setting up, and rejected those that are bad, we proceed to contract to set them up, which is a term, I suppose, that explains itself.

126. Into how many parts do you separate the musket?—We have contracts for barrels; we have contracts for ramrods; we have contracts for locks, and we have contracts for the brasses, paying so much for the labour where we furnish the materials from the old stores, and the stocks we have in hand, and supply; but the shaping them into form is done by the stockers, who are divided into two, the stockers and finishers. We do not come into contact with the stockers; all the workmanship comes under the one head of setters-up.

127. All those different parts are brought in and delivered at the Ordnance Office at Birmingham, are they not?—Yes, or wherever it may be arranged: Enfield, or the Tower.

128. You

128. You deliver them out to the setters-up?—Yes; after they are marked as having passed examination.

129. Have you not very often great delays in getting the proper proportion of materials so as to go on?—At this moment we have been delayed for a long period of time; we are not able to set up the 20,000 arms of 1853, because the persons dealing in the materials have not furnished them.

130. Supposing you had an order, as you say, for 20,000 muskets, I presume you get then 20,000 barrels and 20,000 locks, and you do not give out another order until that has been entirely completed?—Yes, we have been waiting for the approach to completion of the present order to give out another order for the East India Company.

131. But you have not done that?—We should do it if we were in a position to do it, and the order was near its completion.

132. With regard to the order of 1851, you waited to have that entirely completed before you gave out the order for 1853?—But that is not our usual practice; we waited in that case, because the Commander-in-Chief had not entirely fixed on the whole parts of the musket; and therefore, as the contract was not completed, further orders were not given; but the moment the bore of the barrel was decided upon we proceeded to contract.

133. And you gave out that contract of 1853?—Yes.

134. Mr. *Newdegate.*] Did not a long period elapse during which no orders were sent out between 1851 and 1853?—Yes; but then the Committee must be good enough to bear in mind that that order was not completed by the the barrel makers; if they had done that I can hardly doubt that another order would have been given out. We should have gone then to the Commander-in-Chief, saying, "This order is completed, arms are wanted, and if you decide on the barrels we will contract for the new barrels;" but as the 1851 contract was not completed, no urgent step was taken in regard to the decision.

135. Mr. *Geach.*] Then supposing that you ordered these barrels from seven different barrel makers, and from out of those seven had completed their contracts, and three had not, you would consider that the barrels contract had not been completed, and therefore you would wait for that completion before you gave out another order?—No. If we had wanted four barrel makers, and two had completed their contracts, we should have said to those who had completed them, We want barrels, will you take 20,000 more—10,000 a piece, at the same price as the last contract? That is precisely, I can assure the Committee, the line that we should have taken.

136. In 1842, you state, there was a new musket determined upon: can you give the Committee any idea of the quantity of arms that was ordered between 1842 and 1851, when another change came?—Yes; we can make a return of that sort. In the greatest year which I recollect, 50,000 stand of arms were supplied in one year, but a large proportion of those were of an inferior nature. That order was made up in three parts, namely, the Line pattern musket of 1842, the extra service musket, and the sea service musket; I think that was in 1849 or 1850; we had then a store of materials generally in hand.

137. Lord *Seymour.*] You have spoken of three different sorts of muskets; which of those three do you call the superior arm?—The Line pattern musket of 1842.

138. Not the extra service one?—No.

139. Are the different items of which a musket consists, the same now as they were in 1849?—The rifling will be different, and there is some trifling change in the nature of the lock; a swivel lock, instead of that which then existed is introduced, and that makes a difference; then the bayonet, instead of being fixed by a spring, has been changed for another form.

140. In 1849 it was stated that the items of which a musket consisted were the following, namely, the barrel in a filed state at 12 *s.*; you have the barrel now filed and rifled, have you not?—The rifling is not done in the rolling of the barrel.

141. When you spoke of the barrels being in a filed state, you meant that the barrels were filed, but not rifled?—No, nor percussioned.

142. In comparing your contract of 1853 with the prices given in 1849, it will be seen that the barrel in a filed state was at 12*s* in 1849, and that the barrel in a filed state was at 13 *s.* in 1853?—They asked 14 *s.*; we got it at 13 *s.*;

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13 *s.*; the barrel is ·702, the other is ·577, and of course the quantity of material in the present barrel is considerably less than in the old barrel.

143. You entered into a contract for 13*s.*, having been accustomed before to pay 12*s.*?—Yes.

144. Then the lock, in a filed state, was supplied by contract at 7 *s.*—Yes.

145. At what price did you contract in 1853 for the lock in a filed state?—I think the final price was 8*s.* 3*d.*

146. But the lock that you chose in 1853 is a very superior lock, is it not, to the lock chosen in 1849?—No, I do not think it is; it is different in construction; it is a swivel lock.

147. And the other was a bar lock?—No, a hook lock.

148. The swivel lock is considered superior, is it not?—Yes, it is a better lock; but I do not know, as to workmanship, that there is any very great superiority in it.

149. If not a better lock, why did the Board of Ordnance adopt it?—It was recommended by the Committee on Small Arms; and, as I have already stated, is a better lock.

150. Mr. *G. Dundas.*] Is it a back action lock?—No; the mere difference is, that the cock rests upon a swivel, and you release the swivel and then it acts.

151. Lord *Seymour.*] Having obtained the lock at 7 *s.*, you used to have a charge for "hardening the tumbler and freeing the lock"?—That charge still continues, I believe.

152. Then the "jointing and percussioning of the lock;" does that also continue?—Just the same; the barrel is 13 *s.*, the lock is 8 *s.* 3 *d.*, and the bayonet 7 *s.* 6 *d.*

153. The bayonet used to be 2 *s.* 10 *d.*?—Yes.

154. Then the weapon which you have now is very superior, is it not?—If we had machinery we could make that bayonet which is now charged 7 *s.* 6 *d.* for 1 *s.* 6 *d.*

155. You believe so?—I think we can show that on better evidence than my own.

156. The trade charge you 7 *s.* 6 *d.* for the bayonet?—Yes.

157. Is the bayonet quite a different one from the old one?—Not quite different, but it is a bayonet that would cost more making by hand than the other; I think that this is an excessive price, but we could not get it for any other; and if we had stopped on this, the whole setting up of the arm would have been delayed; therefore it appeared to us proper to take it at that price, rather than the country should be without arms.

158. The bayonet was a separate contract altogether, was it?—No; all these are in parts, the barrel, the lock, the bayonet, and the bands, which come next; formerly the barrel was pinned in below; now that is changed to security by bands.

159. The rammer is now 1 *s.* 6 *d.*, is it not?—Yes.

160. It was 9 *d.*, was it not?—Yes.

161. The jointing and percussioning the lock was 3 ½ *d.*, was it not?—It is 6 *d.* now, it was 3 ½ *d.*; the next things are nails for the breech: "breech 1, side 2, 2 *s.* 6 *d.* per 100; 1 *d.* screws, large 2, 2 *s.* 6 *d.* per 100, ¾ *d.* ditto, small 3. 1 *s.* per 100, ¼ *d.* trigger, ½ *d.*; sight elevating, 5 *s.* 10 *d.*;" that did not exist before; "brass work, set, 10 ¼ *d.*; stock, 3 *s.*;" the same as it used to be; "barrel, jigging and filing up lump, 10 *d.*"

162. That used to be 1 *s.*, did it not?—Yes, "setting up, 1 *l.* 3 *s.*"

163. That used to be 1 *l.* 6 *s.* 3 *d.*?—Yes.

164. Therefore it is cheaper?—Yes; "nipple, 3 *d.*; add for cost of plant, 1 *s.* 9 *d.*," and for superintendence and inspection.

165. Do you mean by that, viewing?—No; the establishment and the plant for the buildings at Birmingham, and the rent, divided over the quantity of arms made up in the course of a year.

166. Are you taking now the plant at Birmingham, or do you take in also the plant at Enfield?—Both; 1 *s.* 9 *d.* is the plant at Birmingham, and the plant at Enfield is 2 *s.* 6 *d.*

167. How do you arrive at that?—By dividing the rent, and so forth.

168. What is the whole cost of the musket at Birmingham?—The whole amount at Birmingham is 3 *l.* 9 *s.* 0 ¼ *d.*, including the plant.

169. What

169. What is the contract price?—£. 3. 7 *s.* 3 *d.* without the plant, that is at Birmingham; it would stand for each musket at Enfield at 3 *l.* 4 *s.* 1 ½ *d.*

170. For what you make at Enfield?—Yes; if we make one at Birmingham it costs the Government, without the plant, 3 *l.* 7 *s.* 3 *d.*

171. Is that the contract price at Birmingham?—Yes.

172. Comparing the cost of a musket now with the cost in 1849; the contractor's price then was 2 *l.* 16 *s.* 8 *d.*?—Yes.

173. Therefore the difference in price between a musket now and a musket in 1849, is the difference between 2 *l.* 16 *s.* 8 *d.* and 3 *l.* 7 *s.* 3 *d.*?—Yes.

174. Then it is from that difference that we are to find the sum which constitutes the profit that you are to derive?—No, I think not; the way to get at it is to say: What can you make the arm for by machinery? By machinery we might produce the arm for 2 *l.*, and therefore the saving, if we had 300,000 muskets to make in a year, would be 100,000 *l.*

175. You could produce the arm for 2 *l.*?—I believe we could do it for less, and I believe that it will be shown by-and-bye that we can do it.

176. Then we have been losing for the last 45 years, by paying 2 *l.* 16 *s.* 8 *d.* for a musket, when we might have produced it by machinery at a much less cost?—I believe so, firmly.

177. Mr. *Monsell.*] But the machinery was not invented at that time?—No.

178. Lord *Seymour.*] You are referring now to machinery that has been only invented during the last year or two?—No; I believe machinery was offered to the Government many years ago, which, if they had accepted, and not let it go elsewhere, where it has been used since, although not in America, the Government would have saved nearly a million and a half of money.

179. The first argument in favour of this outlay for additional machinery is, that the country have been losing a large sum for 20 years by not having adopted machinery?—Precisely.

180. Mr. *Monsell.*] Who first introduced into this country the sort of machinery which you contemplate erecting in the Government factory?—Colonel Colt, an American, whose factory, perhaps, would do more to enlighten this question in the minds of the Committee, if they would visit it, than anything that I could say.

181. Lord *Seymour.*] But Colonel Colt's is not a Government establishment?—No, but there are two American Government establishments; and the Committee will find, by referring to the report of the Commissioners who went over to America, that I have overstated the price for which muskets may be produced, and good ones.

182. Can they be produced by machinery at much less cost in the Government factory?—Yes.

183. Colonel Colt is producing them here, not in a Government factory, is he not?—Yes.

184. Why then is a Government factory essential?—He is not producing muskets, but pistols. But I suggest, for the consideration of the Committee, as an answer to that, that the fact of the Government factory answering is proved by the United States Government adopting the thing universally; at least they have two Government factories, capable of producing in each about 300,000 guns a year.

185. Colonel Colt's factory succeeds for the production of pistols, does it not?—Yes, revolvers.

186. If it answers for that purpose in the hands of a private individual, why should it not answer for muskets in the hands of private individuals?—I have no doubt that it would answer to a private individual, but my impression is, that if a Government factory is well managed, the Government, in managing that factory, would make very large savings. When I was examined before by the Committee in 1849, I stated expressly the opinion that I entertain about contracts, that the Government should, for all things which are in ordinary use, contract for them. There is no doubt that they will get them when they want them as good and as perfect as they can be required, but I do not think that the Government does wisely to go to the contractors for things which are not of ordinary demand; and the materials of muskets are not of ordinary demand.

187. You stated, did you not, that the Government would require 30,000 muskets a year for a constant supply?—Yes.

 188. Then

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188. Then a manufacturer would at least have to furnish a constant supply of 30,000 for Government?—Yes, he might have that.

189. Have you any notion of what the East India Company require annually?—I should think that the East India Company would require, to replace the arms, if they were going to change them, somewhere about 300,000 stand of arms at least.

190. Then in that case the manufacturer might look forward, not only to making 30,000 muskets a year for the Government, but to making a very large quantity for the East India Company's service?—I dare say he might; still that does not change my view, which is, that there are certain factories which may be beneficially carried on by the Government, and by which a large saving might be made. For example, I would illustrate that by stating that the block machinery has saved two or three millions to this country, and it has been carried on since it was introduced. I take another thing, the biscuit manufacture, which is carried on by the Admiralty; which has not only insured excellent biscuit instead of the wretched stuff that we used to eat, but it has caused a large annual saving to the Government.

191. The object, as to the biscuits, is to have a very good article?—Yes; still the fact is the same; I can show the Committee that the biscuit manufacture does not only give a good article but a cheap article.

192. You cannot inspect biscuits in the same way as you can a musket?—I do not know; yes, I think we might.

193. You cannot inspect biscuits in the manner in which you can inspect every part of a musket?—You might inspect the wheat and the flour afterwards.

194. You could not take them by contract with a system of inspection as you could a musket?—I think you could; I have seen that done in the Clarence Yard. You first bring in the wheat; you have a certain sample, and you say that none shall be received that does not come up to that weight and fineness. If there come anything under that, they do not take it. If they bring it at the right weight, 60 lbs. a bushel, they pay so much for that per quarter.

195. It was stated that the price was paid expressly because of the quality?—I know that Grant, the inventor of the machinery, has always considered that he produces a great saving to the Government.

196. It was stated to the Committee in 1849, that the general rule should be contract, and the exception to that system should be Government manufacture; do you agree in that?—I quite agree in that, and I have just stated so.

197. With regard to contracts under inspection, the value of the contract depended very much upon the possibility of having a rigid inspection?—No doubt about it.

198. The musket is just that article, with regard to which inspection will answer every purpose?—I am not quite sure about that; in many parts it will. There are a variety of things that are more of a gift in an individual. The viewing of a barrel, after all, is an uncertain sort of thing. A man fixes it up, and imagines that the rays of light, falling in a certain way, indicate that there are certain defects, and so forth, and therefore it is not so easy to view. I think that barrel work might be made more perfect than it is now.

201. But a barrel must be viewed, however made, whether at Enfield or elsewhere?—Yes.

200. They are all equally viewed?—Yes.

201. Whether made by the Government manufacturer or a private individual, they must be equally viewed?—Yes; but the question is whether a better view and a more sure one might not be adopted.

202. Mr. *Monsell.*] In point of fact, are there now in this country any such gun factories as you think it desirable for the Board of Ordnance to erect?—I know of no application of machinery to making muskets in this country, except in the Government factories and Mr. Brazier's lock-making machinery.

203. Therefore the question that we have now to decide is between a system by which a musket costs, including the price of the plant and superintendence, 3 *l.* 9 *s.* a piece, and a system by which, as you believe, an equally good musket can be produced for less than 2 *l.*?—Precisely.

204. How much would that saving be upon the 900,000 muskets which you state it is necessary now to provide by means of such a factory?—Clearly there you would save 1 *l.* 7 *s.* on each musket; upwards of a million on 900,000 guns.

205. Mr. *Geach.*] Do the Government, in giving out their orders, ever encourage the adoption of machinery for making the different parts?—No; but I will tell the Committee what I have said myself on meeting with various gun makers. I stated before, that till within a few months I was friendly to the system of making arms by hand, but I have changed my opinion very recently. I think the Government have set an example, both at Enfield and Birmingham, by applying machinery to parts of that manufacture, which has not been followed elsewhere. I believe, with one exception, namely, Messrs. Brazier, who has done something in the way of locks, nothing has been done beyond the old system of working by hand; and when I talked to those gentlemen, I said, "Unless you do something to ensure a cheaper and better supply of arms, and in a more efficient way, you may depend upon it you will compel the Government, from its necessities, either to purchase of America or Liege, or you will compel them to manufacture them." This was before I changed my opinion; they rather laughed at the idea of going to America, but I said, "You are quite mistaken in supposing that the Government cannot get arms in America; the American Government has 1,000,000 of State arms, and those arms we might get a supply of by sending over at any time by Cunard's vessels as readily as we could have got them some years ago from Yorkshire;" and, I said, "You had better inquire into that, because unless you do make the inquiry and give us greater certainty of supplies, that will be done, or we shall go to Liege, where they make very good arms, or the Government will probably feel itself in a position, which I deprecate, to put up a factory." I have thought since that upon the matter (at that time I really was adverse to the establishment of a factory); and seeing that we could not get arms, reflecting a great deal upon it, and seeing subsequently as I had not seen before the application of machinery in making arms in Colonel Colt's factory, I became a convert to the opinion that it would be both cheap and useful and efficient to put up a Government factory.

206. There is a certain standard of perfection which you will require all this work to come up to; suppose a man brought you some of his articles made by machinery, and they were not quite perfect, would you, because he told you that he was making them by machinery instead of by hand, have accepted those that were not so perfect, or would you have made any allowance for that?—Yes; I should have said, "We have found the little effort that we have made to introduce machinery in the Government factories at Enfield and Birmingham succeed so well in doing the work more certainly, that I quite think you deserve great credit for your exertion, and any assistance that can consistently be given you, I will propose to be given to you."

207. Then it is not within your knowledge that when things that were made by machinery were brought to Birmingham, and delivered in to Mr. Lovell, the inspector, they were rejected for the very fact that they were made by machinery?—This is the first time that I have heard of it.

208. You would not be the person to determine as to whether a thing were received or not; it would be the inspector at Birmingham, would it not?—No; but I look upon it that if any gentleman had put forward things that were rejected without cause, the things being efficient, he would have immediately said to the Board, "Here are the articles that have been rejected, and I appeal against this rejection." The language that I have used ever since I have been in my present position to all the setters-up and the contractors, and all the gentlemen of the trade, is, "We are open to hear everything that you have to say at the Board of Ordnance."

209. Mr. *Monsell.*] Have there not been appeals made in the way you speak of?—Repeatedly.

210. Were those appeals attended to?—Yes; and in three instances within the last 12 months, applications, I think, came personally to me, and I immediately sent them down to Mr. Gunner, the superintendent then at Enfield, and desired him to give me his opinion; and his reply was, "In the beginning of this manufacture I should recommend those being received, but the people should be informed that no tolerance can be allowed below this point, and that as the work goes on they must get rid of this blot." And in all cases in which applications

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applications have been made to me, I have felt it my duty, and as a conscientious obligation, to hear in the most attentive and patient way such complaints as the trade have had to make.

211. Can you state to the Committee how much the raw materials of the musket, which costs 3 *l.* 9 *s.* amount to?—There is a technical term for iron used in that way; it is skelps. The cost of the materials of a musket which costs 3 *l.* 9 *s.* is as follows: "Iron, 3 *s.* 6 *d.*; steel, 1 *s.* 6 *d.*; brass, 1 *s.*; stock, 3 *s.*; coals, oil, grindstones, implements, &c., 1 *s.* 3 *d.*;" amounting altogether to 10 *s.* 3 *d.*

212. How much then does the labour for such a musket cost, according to the present system?—The labour and profit in that case costs 57 *s.*, or something near that.

213. The materials of the musket cost, therefore, about 17 per cent., and the labour on its construction about 83 per cent.?—Yes.

214. Mr. *Muntz.*] Do you speak of your own knowledge upon this subject, or do you take it from report?—I have gone over that question, but I did not make the calculation as it is made in the paper before me. I calculated it in this way: I set out that the cost of the materials was 12 *s.* and a fraction, then I took that from the whole price of the musket, which is, I think, the fair way, and I came to the decision that the labour and profit for making the musket amounted to 2 *l.* 6 *s.* and something. Then you see that will not be materially different from what I stated, 17 per cent. and 83. We arrived at the same result by a different process.

215. The question was, whether you took your data as to the cost of each part of the materials from your own knowledge, or from report?—I do not state the items of my own knowledge, but the statement before the Chairman is not far from being correct, although I have made the calculation in a different way.

216. You have not given it on your own account?—No, but I will give it on my own account; in the way in which I have taken it it bears the ratio of 12 to 55, the labour being 55 and the cost of the material 12.

217. Lord *Seymour.*] You have put down the proportion that is now to be paid for labour and the proportion for materials?—Yes.

218. According to your calculation, could you tell the Committee what you put down for labour, and what for materials?—Yes; 12 *s.* for materials and 55 *s.* for labour and profit, throwing off the fraction.

219. Do you put down anything for profit there for the contractor?—There is the labour of the workmen to be taken out.

220. What do you leave for profit?—He takes that out of the labour; what he can get out of the 55 *s.*

221. Mr. *Walpole.*] Have you made this calculation according to the price of labour at this present time, or when?—The present price.

222. Then I understand you that you have put in two items, the rough materials at 12 *s.*, and the labour at 2 *l.* 5 *s.*?—Yes; then I take off the superintendence.

223. Lord *Seymour.*] It would appear from a letter which you have read to the Committee, that the great difficulty in performing the contracts arose from strikes?—Yes; one of them.

224. What certainty shall you have that there will be no strike in a Government establishment; is there never a strike in a Government establishment?—First of all you would not have so much skilled labour, and what you had would be well paid, and the majority of the labourers would be of an inferior class doing work only requiring manual labour.

225. A few men would find it more easy to combine than many, would they not?—Yes.

226. Therefore the few men in the Government factory would find it more easy to combine than a larger number at Birmingham, or elsewhere?—Yes, but we should have then another set-off against that; we should have artisans capable in the various establishments of Glasgow, Leeds, Birmingham, and elsewhere to draw on; we should have the whole world, in fact, and if we could get nothing else we should go across to Liege and bring a few clever men over, and in that way we should, I think, have a full counterpoise to the combination of a few men.

227. By

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227. By forming this great Government establishment you will necessarily destroy, will you not, in the country the trade of musket making?—No, I think not; military gun making you will. For example, the Danes two years ago had a large order in this country, and a friend of mine came to me and said, "I have just been buying some arms that were purchased of the same people, who have set up arms for the Danes; you are giving 2 *l.* 16 *s.* 8 *d.*, and I have bought a beautiful stand for 17 *s.* 6 *d.* each."

228. Who viewed those muskets?—I was going to say how it was that they were got so cheap; it was, because there was no view, and they were made up from the old materials sold from the Tower.

229. Mr. *Monsell.*] There have been strikes of labourers during the last few months; have there been any strikes in the departments, either of the Admiralty or the Ordnance?—Not one.

230. Each of those departments employs a very considerable number of labourers?—Yes; I have been 51 years in the service, and during that time I have not known a strike in a dockyard or under the Ordnance.

231. Are you aware of the fact that in the Government gun factories in America the number of skilled labourers employed is only ten per cent.?—I do not know that of my own knowledge; I believe that is the fact.

232. Mr. *Geach.*] Have you ever seen one of those guns that have been made by machinery in America, which you say could be made for 37 *s.* or 2 *l.*?—No.

233. Then you do not know whether that gun, if brought to this country, would be such a gun as you would pass from the manufactory at Birmingham?—I have inquired, on good authority, of persons capable of giving a professional opinion, and I am assured that the gun made by machinery in America is equally good and efficient as our gun; and I do not think that any military arm can be got up in a better or more perfect style than the pattern musket of 1853, which has been tried as an experimental musket.

234. Are you aware that we send a large quantity of guns, not military guns, but of the better order of fowling pieces, to America from this country, made by hand labour?—Yes, and a large number to the Cape of Good Hope and the Coast of Africa. Those sent to the Coast of Africa are made for about 10 *s.*

235. With regard to those more expensive guns, you state that there is a certain class of workmen who make the higher order of guns that you cannot afford to employ, and a certain class that make the lower order of guns who are not sufficiently qualified?—Yes.

236. Are you aware that of those expensive guns made by the higher order of workmen, a great many are sent to America?—The first-rate guns, I should think, go. I have no doubt that the trade of Birmingham in a first-rate article, is superior to that of any country in the world.

237. Are you aware also that a large number of guns go to America of the second quality much cheaper than yours?—Yes, I have heard so. I do not know that. Everybody wants a gun in America, and of course every man wants one as cheap as he can get it, and I dare say many of them go at a lower rate than that at which the Government factories of America would make them.

238. What reason have you for thinking that machinery is the best mode of manufacturing guns (which you may be right in), or some parts of them, and what reason have you for supposing that the Government peculiarly possess all the advantages that arise from machinery, and that other parties cannot avail themselves of those advantages?—One of my reasons for believing that there is an advantage in the case of machinery is, that I observe a government so shrewd, and so closely investigating public expenditure as the American Government, have adopted these gun factories; then I know, from my own experience, that the American Government are wise enough to say, that all their equipments shall be of the best sort, both in the navy and in the army, and they take great pains in that respect; then I come to the conclusion that it is not possible for such a government to allow an arm not suited to military purposes to be made for their troops; I know that the pistols which they have recently adopted in the American navy, after very scrutinizing trials, are made by machinery.

239. Are they made by the Government themselves by machinery?—No; I believe the pistols are made by Colonel Colt. He having a patent, they are made for the American Government by him; but the muskets for the militia and the

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the army are made in the Government factories, two of them, and they are made, as I understand, considerably below 2 *l.* apiece.

240. Mr. *Newdegate.*] You have heard that the price is below 2 *l.* apiece?—Yes.

241. Was that exclusive of all charges for the establishments?—I cannot answer that; I am not aware of that.

242. Mr. *Muntz.*] Are you aware that an immense number of guns go from Birmingham to America at a price varying from 2 *l.* to 20 *l.* each?—I know that a considerable portion of the first quality of guns go, and I thought that the price went down very much below 2 *l.*

243. A great portion are at 3 *l.* each, and they pay 30 *s.* per cent. duty for entrance; are you aware of that?—I am only aware generally that there is a considerable trade; but I know, from some circumstances, that some gentlemen engaged in the gun trade fancy that, from mismanagement of the trade in not endeavouring to get arms up in the cheap way which machinery would enable them to do, that they have lost a good deal of the trade to America.

244. When you speak of machinery, are the Committee to infer from that that you are going to manufacture a gun entirely by machinery?—Nearly so.

245. What proportion of a gun is manufactured now except by machinery?—First of all, the barrel rolling is by machinery. In Birmingham I am not aware, except in Messrs. Brazier's factory, that any machinery is applied; everything is done in the separate residences of the artisans, and I have heard of no instance of anything being done by machinery excepting in the Government factory, where, as I have stated before, a steam engine has been put up, by which we can joint and percussion the arms; and instead of employing highly paid labour, we have but one or two skilled men to carry on all that by cheap labour, which we obtain from boys.

246. Colonel *Dunne.*] In the case of the rejection either of a barrel or a part of a lock by the viewer, on whom does the loss fall; on the contractor, or on the manufacturer?—On the contractor; the contractor is the manufacturer. There is an agreement between the contractor and the man, and according to that agreement, in some instances, the man pays a considerable portion of the loss; in some instances he pays all. If, for example, by his inattention he has scooped out too deep a portion of the bayonet, and if that was rejected, the loss of the material would fall upon the master, and the loss of labour on the man, I believe, but I may not have been correctly informed.

247. Is that an arrangement between the contractor and the man, and not an arrangement between the contractor and the Board of Ordnance?—It is no arrangement with the Board of Ordnance.

Lunæ, 13° *die Martii*, 1854.

MEMBERS PRESENT.

Sir William Molesworth.	Lord Seymour.
Mr. George Dundas.	Colonel Maule.
Colonel Lindsay.	Mr. Muntz.
Mr. Newdegate.	Mr. Walpole.
Colonel Boldero.	Mr. Monsell.
Lord Paget.	Colonel Dunne.
Mr. Geach.	

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Captain Sir *Thomas Hastings*, R. N., C. B., called in; and further Examined.

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248. Lord *Seymour.*] IN answer to a question that was put to you on the last occasion by the Honourable Member for Coventry, you stated that you had never seen one of those guns that had been made by machinery in America?—Never.

249. And you stated that your opinion respecting them was founded on good

good authority, namely, on the authority of persons capable of giving a professional opinion?—Yes.

250. Was that authority one of the gentlemen connected with the Ordnance Department?—No, not connected with the Ordnance Department.

251. Are the Committee to understand that the Ordnance have recommended the establishment of this large machinery for the manufacture of guns, without having themselves or any officer of the department having seen a gun so made by machinery?—I do not think that either the Master-general or the Board have seen a gun made by machinery, but I should add that my opinion is formed on the opinion of Mr. Anderson partly, the engineer of the department, and other officers, though I have not consulted them directly as to that particular gun; my opinion is formed on conversations which I have had with Mr. Anderson, and papers that I have read, written by him and by other officers employed to examine into this matter.

252. Since you have formed your opinion upon what you consider good authority, can you state to the Committee what your good authority is?—I consider Mr. Anderson a good authority.

253. Has he seen the guns in question?—I do not know; I think not.

254. Then what in fact is the authority of the person who has seen the guns, and whose opinion has guided the Ordnance?—I think it is founded on the opinion of what may be produced by the application of machinery, as shown in Colonel Colt's manufactory, and on the opinions of Mr. Anderson, a very competent person, who will give the Committee information in detail much better than I can; and of the officers composing a committee of inquiry on the question of the improvement of small arms.

255. But with regard to those officers who composed the committee of inquiry on the improvement of small arms, had they under their inspection at the time one of those guns?—I do not know that they had; but they had inspected machinery bearing upon this question, and I believe the Committee will find that they are perfectly competent to give an opinion to guide the Committee.

256. You stated, did you not, that you had spoken to the gunmakers at Birmingham, and told them that the Government could easily obtain a supply of arms from America?—Yes.

257. As the Ordnance were going to proceed upon the system which you say is adopted in America, why did they not send for a supply of guns, or send for one gun, in order that they might judge of the weapon before they proceeded to manufacture it in this country?—When I had that conversation with the gunmakers and the gentlemen employed in obtaining materials, I had not made up my mind that it would be desirable for a factory to be established, nor had my colleagues, the Board, finally made up their minds.

258. Is there an officer of the Ordnance engaged in America at this time in making inquiries on the subject?—Yes, there is.

259. Mr. *Muntz*.] What is his name?—Colonel Burn.

260. Lord *Seymour*.] He is now engaged in inquiring into this matter, is he?—Yes.

261. Have the Ordnance not entered into some contracts for the supply of machinery?—No; there has been a conversation about it, but I do not think that at present there is any official contract for machinery; there have been inquiries. I have been asked whether we had any authority upon which to form our opinions: I may say that I attach much importance to Mr. Anderson, and the committee of inquiry who have been appointed to inquire into this subject.

262. You stated on your former examination, "I have inquired on good authority of persons capable of giving a professional opinion, and I am assured that the gun made by machinery in America is equally good and efficient as our gun; and I do not think that any military arm can be got up in a better or more perfect style than the pattern musket of 1853 that has been tried as an experimental musket," though you did not give the Committee any authority upon which you relied?—I rely on Mr. Anderson and the officers appointed by the Master-general and the Board, to inquire into what improvements might be made in the construction of small arms by the use of machinery.

263. Mr. *G. Dundas*.] Was the pattern musket the one that was made in Enfield, and that was tried in 1852?—The 1853 musket.

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264. Colonel *Maule.*] It is in fact the musket of 1852, is it not, with some slight modification and improvement?—Yes.

265. Lord *Seymour.*] The modification being an alteration in the size of the bore?—Yes.

266. You have reduced the size of the bore?—Yes, from ·702 to ·577.

267. The Duke of Wellington was always in favour of a large bore, was he not?—That was in reference to a different musket, to the smooth-bore musket.

268. In 1852, while the Duke of Wellington was at the Horse Guards, he still approved of the musket with a larger bore?—Yes, but that depended much on the weight; the weight of the present bullet is the same as that of the larger bore, having a spherical ball.

269. Mr. *G. Dundas.*] That is 16 to the lb., or an ounce ball.—No, 14 ⅛.

270. *Chairman.*] You stated before that you took steps to procure 28,000 rifle muskets in May 1851?—Yes, and contracts were entered into in June 1852 for their supply.

271. How long did it take to get them?—They were not delivered till November 1853.

272. When did you take steps to provide 2,000 artillery carbines?—In April 1853 contracts were entered into for them.

273. Have any of those carbines been yet delivered?—Only 500.

274. Lord *Seymour.*] When was the date of the contract?—In April 1853.

275. When were they to be delivered?—I cannot state without referring to papers which I have not here; but I can add, though I cannot give the Committee the exact date, that we have been continually pressing for the delivery of those carbines.

276. Is the carbine the same pattern in the barrel as the musket?—Yes; I can now answer the former question. In April 1853 contracts were entered into for barrels for 2,000 artillery carbines with Messrs. J. Clive, H. Clive, E. Millward, Beasley, Turner and Sons, Deakin and Sons, and W. Millward; the tenders of these individuals were at the uniform rate of 10 *s.* 6 *d.* for each barrel, showing thereby the usual combination amongst the barrel-makers; these barrels were agreed to be delivered at the rate of 100 per week by each contractor after six weeks from the date of the order, so that the final delivery ought to have taken place in June 1853; but this was not done until September 1853, as reported by the inspector of small arms. An agreement was entered into for the setting up of this number of carbines on the 5th of October 1853 with Messrs. Hollis and Sheath, Swinburn and Son, Tipping and Lawden, and T. Turner, at 24 *s.* 11 *d.* each, to be completed within six weeks after the delivery of the materials. But so great has been the difficulty and delay in obtaining materials, that, notwithstanding all the efforts of the Board, not more than 500 carbines were completed by the end of January 1854; the delay is attributable to the difficulty in obtaining and collecting the requisite materials, for although in April 1853, contracts were entered into for every material necessary, a sufficient quantity was not delivered to enable the Board to issue more than 1,100 complete sets to the contractors for setting up until the 21st of January 1854.

277. When were the materials delivered to them?—I will ascertain that.

278. This applies to the setters-up?—Both to the suppliers of materials and the setters-up; the setters-up have been prevented from setting them up because the materials have not been delivered; but the setters-up at one time wrote and also personally told me that if we pressed for those 500 they would get them ready a little sooner than they did get them ready.

279. Is it not the fact that the different parts of a carbine are delivered by the first contractor to the Government, and by them re-issued to the setters-up; or are they delivered by the manufacturers to the setters-up?—No, everything is delivered by the persons who contract to supply it for the Government inspection, and then by the Government they are re-issued to the setters-up.

280. And thus you say that the fault was not with the setters-up, but with the first persons, who did not fulfil their contracts?—Perhaps they were both in fault to a certain extent, because the setters-up applied to me, and offered, at a loss to themselves, to send them in more rapidly than they had proposed before, and I concluded that they were both in fault, but principally the persons who had failed to supply the materials.

281. *Chairman.*]

281. *Chairman.*] Whichever was in fault, you have had only 500 carbines delivered, out of the 2,000 which were contracted for in April 1853?—Precisely.

282. Mr. *Muntz.*] You mean that only 500 have been received?—Only 500 have been set up and delivered in.

283. Are you aware what number have been sent to view?—No, I cannot state that.

284. *Chairman.*] Did you also take steps in August 1852 to procure 20,000 rifle muskets?—Yes; tenders were issued for setting up 20,000 barrels; and the offers to contract were so unsatisfactory that they were again advertised for, and those tenders were again answered without eliciting one single new tender. The only tenders received were those from persons who had already tendered, and they were again so unsatisfactory that negotiations and interviews were had with the parties at Birmingham, to induce them to lower their tenders; and so great has been the delay in procuring materials, that the Board have only been able to enter into a contract for setting up, on the 21st of September 1854; they have not yet been able to begin setting up.

285. Mr. *G. Dundas.*] You have mentioned a considerable number of barrels as having been rejected; do you think that those barrels were rejected for flaws that would have rendered them really unserviceable, or were they rejected merely for little specks, as has been represented, which in fowling-pieces made for gentlemen who paid considerable sums for them, would never have been noticed?—I believe, on an examination which took place before Lord Hardinge, that the examination of them had been just and fair; that was the conclusion which he arrived at in the presence of the barrel-makers and other gentlemen, and the Honourable Members for Birmingham, in 1852; I have had no reason since to change the opinion which I then entertained. I will put in one letter, which shows how things have been going on as to the barrels.

286. *Chairman.*] Is that with reference to those 20,000 barrels?—No, it is in reference to the contracts for the barrels in 1851: "Mr. Lovell presents his compliments to Mr. Butler, and begs to enclose a statement in detail, showing the progress made by each of the master barrel-makers at Birmingham up to 13th instant, in the contracts entered into under the Honourable Board's order of 6th June 1851 $\frac{8}{1361}$ for the supply in the aggregate of 23,000 barrels for rifle muskets in the filed state; the 5,000 barrels in the rough rolled state, included under the same order, have been all supplied in due course. As an illustration of the entire monopoly which has always existed in this branch of manufacture, Mr. L. begs to enclose the copy of an order that he received from the Honourable Board on the 20th February 1839, when all the barrel-makers joined in demanding one and the same price, and that price 21 *s.*, when the real value was not over 12 *s.* Since that period, from the same combination, the department has at several times been forced into paying for barrels in the rough rolled state and lumped, &c., at Enfield, musket, weight 8 lbs. 10 oz., 5 *s.* each, or 64 *l.* per ton; rifle, weight, 6 lbs. 10 oz., 5 *s.* each, or 84 *l.* 10 *s.* per ton; carbine, weight, 5 lbs. 11 oz., 4 *s.* each, or 78 *l.* 16 *s.* per ton, when the iron of which they were made did not exceed the price of 20 *l.* per ton; and under the order above quoted, of 6th June 1851, for rough rolled musket barrels not lumped, at the rate of 42 *l.* per ton, when the iron cost no more than 18 *l.* per ton, and this solely because the Ordnance Department had not the means and machinery for making the barrels in the Royal manufactory, where there is an abundant power of water unemployed. It will be seen by reference to the last series of tenders offered, that they are all at the same price, which shows that there still exists the same combination amongst the barrel-masters at Birmingham. And it must be always borne in mind that military barrels are not made at any other place in the United Kingdom."

287. Mr. *Newdegate.*] With reference to the interviews which took place between the Master-general of the Ordnance and the barrel-makers and others from Birmingham, to which you have alluded, I wish to ask you whether you do not remember that there were two interviews at which the Honourable Member for Birmingham and I were present, and that at the first of those two interviews it was represented to the Board that 60 per cent. of good barrels had been cast aside by the viewer (that was the substance of the statement), and also

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also that those barrels which had been rejected had been privately marked by the trade, and that they were subsequently passed by the same inspector. I ask you whether you do not remember those facts, and whether, almost immediately subsequently to that interview, Mr. Lovell the younger, who had been employed as viewer or inspector in Birmingham, was not removed from his office?—I can state that there were two interviews, and that at the conclusion of those interviews Lord Hardinge expressly stated, in summing up, after hearing attentively the whole case, that he had arrived at the conclusion that there was no case established of unfair dealing on the part of the inspector, and he stated that he was to pursue the same strict and honest course of inspection which he had before pursued, and that he had no fault to find with him on that point. That was Mr. Lovell the elder, the inspector of small arms. I have somewhere a note made by Lord Hardinge at that time, I believe very much to the effect of what I have stated. In reference to Mr. Francis Lovell, the son, it is true that he was discharged from his office at Birmingham as assistant inspector of small arms, but the cause of that had no reference whatever to the manner in which he had executed his duty at Birmingham. The cause of Mr. Francis Lovell's discharge from the Ordnance Department rested entirely on other grounds.

288. Are the Committee, then, to understand, that the representation made at that first meeting, with reference to casting 60 per cent. of good barrels, produced no effect upon the Board of Ordnance, and that, although Mr. Lovell, jun., who was then the acting inspector at Birmingham, was removed, the Board of Ordnance did not consider the facts then adduced as any reason for removing him, or attach any weight to that representation as a cause for his removal?—I believe that all the rejection at that time took place in consequence of the trade having been for some time in abeyance; Mr. Marshall, who, with the exception of Messrs. Beasleys, was the only roller of that particular iron, not being in a situation to furnish as good iron as he usually does furnish, and has since furnished. There are two modes of rejection; one, that is final, with what they call the condemning mark, and the other merely a mark indicating that the barrel requires some amendment before it can be received. Now I believe that none of the barrels which had the condemned mark were subsequently received, but those which had the mark, indicative that an alteration was required, were many of them received; the barrel makers complained that it was hard upon them to put the condemned mark upon a barrel that was fit for other purposes, because it rendered it unserviceable for purposes not military, and then the affixing of the condemned mark to any barrel which was not absolutely unsafe was discontinued. I assure the Committee that Mr. Francis Lovell's removal rested on causes anterior to the whole of this, and that the business underwent a patient investigation, after which it was deemed imperative to dismiss him.

289. Colonel *Dunne*.] Was not the decision of the Board, as to Mr. F. G. Lovell's removal, before this interview, which has been referred to?—No, I think not; I think he was at Birmingham at the time.

290. Mr. *Newdegate*.] Are the Committee to understand that the Board of Ordnance disbelieved and rejected the evidence of the circumstances to which your attention has been called, represented as they were by the arms trade to the Board of Ordnance at the first interview?—I think the Honourable Member must recollect that Lord Hardinge, in the presence of the Honourable Member for Birmingham, actually dismissed the case as being unsustained, and that he expressed his wish that the business of inspection should be carried on in a very fair and just manner, without any litigiousness or severity, but he expressly stated, so far as I remember, that he did not consider that any case was made out of unjust or unfair inspection; that is the impression which has been left on my mind.

291. With respect to the subsequent interview, the second interview, which had reference to the fact that it had been found that a large number of the Minié rifles ordered in 1851 had been marked crooked for sighting, I would ask you whether you remember that circumstance being represented to the Master-general of the Ordnance, and whether any notice of that circumstance was taken by the Board of Ordnance?—The complaint I recollect, but I do not recollect

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recollect that that complaint was established in such a form as to allow of any step being taken to visit those people with punishment.

292. But you clearly recollect the fact that the greater part of the early deliveries of the Minié rifles were all crooked sighted, and that evidence was adduced to you that the barrels had been marked crooked sighted by the inspector?—Yes, I recollect that; I recollect that defect, and I am ready to state that the defect in sighting those muskets originated from the circumstance of its being a new work with the inspector of small arms, and that we were so convinced of that that we received the arms as they were, and corrected them at the expense of the Government.

293. Then that error on the part of the inspector of small arms accounted for the delay arising out of the necessity for altering those arms?—No, because we altered the greater part of them ourselves.

294. Then you do not regard the delay which the crooked sighting of those muskets produced as at all bearing upon the question of whether the trade of Birmingham is competent to supply the Ordnance or not?—I do not think that the trade were quite exonerated from blame in that business; but the original cause, the evil being with the Government officer, it was thought just to the trade to receive the muskets.

295. From whom did the original information as to those muskets being crooked sighted emanate; from the trade, or from the inspector of small arms?—I believe the first intimation we had of it was from the military, when they were put into the hands of the Guards.

296. Colonel *Maule.*] Are the Committee to understand from you that no complaint was made by the setters up with reference to the false sighting of those arms?—Not till the complaint had been made by the Guards.

297. The question was with reference to any damage or detriment sustained by them?—No.

298. Colonel *Dunne.*] It would not be discovered by merely looking at the gun; until they began to use it, they would not find it out?—I think not.

299. *Chairman.*] You stated that you took steps in August 1853 to procure 20,000 rifle muskets; how many of them have been delivered?—Not one.

300. You stated that there was a difficulty in procuring materials for those; what was the cause assigned for that?—The difficulty of obtaining workmen, and the strikes for higher wages.

301. Have you made an abstract of the excuses made by the contractors in 1854?—Yes, I have a resumé in my hand which I will hand in (*handing in the same*); and I have also here "Extracts from letters of the contractors for materials for 20,000 rifle muskets, pattern of 1853, stating causes for the delay in completing the same. Locks: Messrs. Joseph Brazier & Sons, dated 16th January 1854, 'The delay of sending our supply is caused by the unwillingness of the men, refusing to make the locks at the price we understood was to be paid.' Rods: Messrs. T. & C. Gilbert, 16th January 1854, 'We have been disappointed by two of our oldest rod hands, who promised to come to work, but have not.' Bayonets: Messrs. Heighington & Lawrence, 16th January 1854, 'Our blade forger, the only one we have who can forge bayonet blades, has had a severe illness for three weeks.' Barrels: Mr. H. Clive, 17th January 1854, 'My non-fulfilment of your contract for last month arose from two causes; my not being able to make arrangements with my men so soon as I had anticipated, and by the frost, and want of coal.' Barrels: Mr. John Clive, 17th January 1854; delay, 'continued strike of workmen.' Mr. Ezra Millwood, 16th January 1854, 'The deficiency of the barrels agreed to be delivered by me has been occasioned by my men, the grinders and filers, turning out for price.' Bayonets: Messrs. G. & E. Roe, 16th January 1854, 'We have been behind with the supply, but have had a great difficulty in procuring workmen.' Barrels: Messrs. Turner & Sons, 16th January 1854, 'We beg most respectfully to state the reason we have not done our quantity of rifle musket barrels, is, we have had a breakage with our mill.' Messrs. Beasleys & Farmer, 17th January 1854, 'The delay has been caused by a strike of our workmen.' Locks: Messrs. Joseph Brazier & Sons, 18th January 1854, 'In the first place, there was a strike with the men refusing to file them (the locks).' Locks: Mr. John Duce, 26th January 1854, 'The viewer has been very vexatious in the viewing, which has caused much needless delay.' Then, signed by Benjamin Turner, on behalf of the trade; received 3d February 1854, 'But since then some

Vide Appendix.

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some of them think their price too much, have called a meeting of the masters, and met at the 'Turk's Head,' Wednesbury, where they combined together, and, as we are informed, given or signed a bond to each other to give no more than 6*s.* per lock, and go as far as to say they are having the work in faster than they want, which has induced us to stand, though much against our will; therefore, we humbly beg your consideration on our case, and adopt such plan as will put down this oppression that is bearing upon us, and will cause us to take to other sort of work, which will injure your supplies if they are wanted. The trade is in great confusion, and we must look for other sort which will keep us on regular for the support of our families.' Bayonets: Messrs. John Roe & Son and G. W. & E. Roe, 3d February 1854, 'We have therefore great difficulty in getting men to finish and fit them properly. If you could allow us a little ease in the inspection we should be very thankful.'"

302. Mr. *Muntz.*] Did you ever hear that the arrangement made about the price of the locks was made at the instigation of young Mr. Lovell himself?—No, I did not, because I do not think that young Mr. Lovell was there at that time; he had been discharged before this contract in 1853 took place. I was down myself and saw the lock makers, and I know that the prices varied from 8*s.* to 9*s.* 6*d.*

303. What does the letter which you have last read relate to?—It relates entirely to the contract of 1853.

304. Colonel *Lindsay.*] Young Mr. Lovell was discharged before August 1853, was he not?—Yes, before; I should think it must have been in 1852. It must also be recollected that the want of one barrel roller may stop the whole supply of arms, and great difficulty has been experienced in getting a barrel roller at Enfield for any wages. I believe that this slow progress is inherent in the system, and that the system cannot be altered without risking the efficiency of the arms produced, if contracts and hand labour are to be continued; you cannot give up the viewing. As to rapidity, the difference between the present and the proposed system is, that by the one you cannot be sure of procuring 25,000 muskets in the year, whereas by the other you might produce 150,000 a year if you wished to do so.

305. Lord *Seymour.*] When it is said that you might produce 150,000 a year, if you wish it, can you state what has been produced by this machinery in a given time?—We see that in the pistol factory; and not to go into the inquiries made by the officers, I now only speak of my own knowledge; you may make, as in the factory of which Colonel Colt is the head, 700 pistols a week; therefore you have only to change the plant to one for making muskets, and you will produce the same results; if you enlarge the factory on which you make your calculation, you may make it a factory for producing 100,000, or for the production of any number you please.

306. If you incur expense enough you may produce any number of muskets? Precisely so.

307. By enlarging the establishment, by additional machinery, and employing additional men for superintending?—Yes.

308. *Chairman.*] While you cannot now obtain 20,000 by any amount of expense that may be incurred?—No; I would say 25,000, because that exceeds the contract of 1851, which was one for 23,000; we did not get them, and now we have not got 20,000 in six months, nor shall we do so probably; we have not got 5,000 yet.

309. Lord *Seymour.*] I do not find in the return before me, that there has been uniformly this want of regularity on the part of the contractors in sending in their barrels; for instance, I look at W. Millward, who was to send in 200 barrels on the 14th of January. and according to this return, he actually sent in 230?—He had had one month's law then.

310. It says here, "Numbers agreed to be delivered by the 14th of Janu ary"?—But we were obliged to extend leave one month before any deliveries were made.

311. This return is to show the Committee, according to the agreement with the Ordnance, when they should have been delivered in, and when they were actually delivered in?—Yes; but the Committee must take into consideration the note appended to that return, because the delivery must be taken in conjunction with that.

312. The Ordnance are surely not going to complain, after giving additional time

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time to the contractors, because the contractors took advantage of that additional time?—No, we are going to show that though we granted the time, because we could not help ourselves, still it is a defect in the system, that we have not got the arms in at the time it was intended.

313. Looking to this return, according to the time that you agreed to for them, 200 were ordered to be delivered in by the 14th of January, and the contractor absolutely delivered in 230?—He first agreed to deliver them in by November, and that is of course making the return from Birmingham; the clerk makes out his return according to the Board's order. I submit for the consideration of the Committee, that if they wish to know how far the contractors complied with the contracts entered into, they must set off against that the time which we were obliged to give them, because we could not help ourselves.

314. I find that Hill & Sons, with respect to bayonets, were ordered to deliver in 200 by the 14th January, and they delivered 350?—Yes.

315. It does not appear, in looking through this Return, that in all cases there has been this deficiency?—No; I will put in this Return also, which shows the deficiency at certain dates. (*The same was delivered in*).

Vide Appendi

316. As to bands, I see that Aston was to deliver in 2,500 on the 14th of January, and it seems to be admitted that he delivered 2,499, being only one deficient in that large number; again, I find that he was to deliver in 2,500 of another kind, and he delivered in 2,738?—I would state in reply to that, that it appears to me that anything I have to say is not against those individual contractors or workmen; but it appears to me, so far as I am capable of judging, that it is a conclusive document to establish the fact that you cannot get those arms, because when I saw those gentlemen I stated to them that they were urgently wanted. I pressed upon them to forward them as quickly as possible, and I intimated further that the moment that that contract was completed others would be brought forward. Now you see, as a matter of fact, it stands thus: that we have not yet been able to get a sufficient number of those materials to commence the setting up. Looking upon this question, not as making any charge—for I do not make any—but as a great national question, it appears to me that with regard to a thing which is of so much importance as this, when the Government was urging the gentlemen who had this business in their hands to the speediest possible completion of their contract, that all they could do between the 6th of October, and the present time, was to admit that they could not deliver materials to commence setting up 6,000 stand of arms; I say it appears to me to be a case which throws a heavy responsibility on the Ordnance Department.

317. It is desirable that the Committee should understand whether this objection to the supply by the contractors is an objection to the contractors under any circumstances; whether, if the contractors had machinery, they would be able to supply, or whether even then you would not distrust them on account of possible strikes among their men, and whether it is absolutely necessary that Government should undertake the manufacture themselves?—My own opinion is, feeling the responsibility which rests on the Master-general and the Board of Ordnance for furnishing arms, after the failure of the contract in 1851, the failure as to the artillery carbines in 1852, and of the recent contract for the 20,000 muskets in 1853, that it is imperative for the safety of the country to put the fabrication of arms on such a footing, that in times of great emergency, if a large demand should be made, this country should have the power of arming its population, which I do not believe it has at the present moment, if you mean to put in its hands the improved weapon with which the armies of Europe are or will shortly all be armed.

318. When you speak of putting the supply of arms on such a footing that they can be provided, do you mean that you believe it can only be done by Government manufacturing them?—I believe it is the most sure and efficient way; and perhaps, as I have stated so broadly why I think a factory necessary, I may be permitted to add that it is not only on the grounds which I have already stated, but also on account of the cheapness.

319. Mr. *Newdegate*.] Are you aware of the fact that the rejection of materials, for the want of which you complain, has risen from an average of about 10 per cent. previously to 1851, to an average of about 40 per cent. subsequently to 1851?—I do not know exactly the per centage, but it is clear to me

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me that that must partially arise from the present arms requiring more skilled workmen, because if you rifle the ordinary musket barrel (unless it is thoroughly perfect), you greatly increase the chances of its bursting.

320. The question did not refer to arms completed, the rifling being the last process, but to the materials; are you aware that the rejection of the materials, that is the locks, the barrels in their raw state unrifled, the rammers, and so forth, has risen from an average of about 10 per cent. before 1851, to 40 per cent. or something near that subsequently to 1851?—I have already stated that I cannot answer that question; but relative to the contract of 1853, the present inspector of small arms, who has been employed as superintendent of arms at Lewisham and Enfield for many years, and has had almost the entire superintendence, will be able to speak to that fact.

321. Might I ask you whether there was not a new set of instructions, with respect to inspection and view, issued in 1851?—I cannot state the date, but I will refer and ascertain.

322. Mr. *Muntz.*] Were there not new instructions given?—When the inspector of small arms was transferred to Birmingham as a permanent residence, then his instructions were revised to meet the altered position of his residence.

323. Were not the instructions given to the viewers in writing?—I cannot state that.

324. Are you aware that they have been withdrawn within the last month?—No, I am not.

325. Can you undertake to produce them if they ever were given?—The details of the management of the factory at Birmingham are of course left to the inspector of small arms.

326. When you were so pressed for arms, and found such difficulty in getting them, did you ever give any contracts or orders to London gun-makers?—No, and for this reason, that one of the principal stops to getting the arms arose from our not being able to get materials.

327. Colonel *Dunne.*] Was not a contract for carbines given at the time that the Seventh Dragoon Guards went to the Cape, to a London gunmaker?—Yes.

328. Did he not fail to complete it, so that the carbines were not ready?—They were not ready.

329. Do you remember the reason then given by him; was it not that on account of a combination among the workmen he was prevented?—I believe it was.

330. Do you recollect that it was stated that the circumstance of the contract being given to a London maker caused a combination, so that he could not complete it?—Yes.

Mr. *John Anderson*, called in; and Examined.

Mr. *J. Anderson.*

331. *Chairman.*] WHAT office do you hold?—That of Chief Engineer in the Arsenal; although "chief" is not my title, I am the chief engineer in the Royal Arsenal at Woolwich.

332. How long have you held that office?—I have not held that office for more than two or three weeks, but I have been acting in that capacity for the last eight or nine years.

333. In the beginning of last year were you sent into the manufacturing districts?—Yes, in March, last year.

334. For what purpose?—It was in connexion with a branch of manufacture connected with the forging of wrought iron, for special purposes, and to see if there was anything in the country to bear on it. After visiting most of the principal works both in Yorkshire and Lancashire, and the neighbourhood of Birmingham, we saw very little that bore upon it, but we saw a great deal that bore upon other branches of manufacture, connected with arsenal purposes, and reported accordingly to the Board when we returned.

335. Did you then examine into the state of the gun trade at Birmingham?—When in Birmingham, Lieutenant Warlow being with me, who was acquainted with many of the gun-makers, we went to a number of the works just to see them; not with any business; we had no special business, but we did so, and

on

on coming back to London it was just incidentally mentioned in the report that we had seen them.

336. What was the result of your inspection of them; what impression did it produce upon your mind?—I have just written down the words which were used in that report. I say, that during the month of March 1853, along with Lieutenant Warlow, Royal Artillery, I visited some of the principal manufacturing towns, the object of this visit not having any relation to the subject of small arms; but being in Birmingham, we called at some of the small arm-works, and feeling greatly disappointed, the following remark occurs in the report, which was written after arriving at Woolwich, viz.: "We then visited a number of establishments engaged in military musket and bayonet work, all of which, however, are in a low mechanical state, and at least 50 years behind most of the other branches of manufacturing industry which we have been examining." I may mention that the other branches here referred to are, the cotton, flax, and woollen trades, engineering and machine making, the tool makers of Leeds and Manchester, steel pen and wood screw making of Birmingham. Those we were very much pleased with.

337. Was that in the report dated the 25th of March?—Yes.

338. Did you, in September last, again report to the Board of Ordnance on the manufacture of laboratory articles?—In the month of September 1853, I was called upon by the Master-general and Board to draw up a report on the manufacturing of laboratory articles by machinery in a better way than at present, quicker, and at less cost, more with the object of introducing the system into their arrangements; and in that report, just at the end of it, I made this remark, which I will read; that was on the 28th of September, before anything was said about small arms: "From what I have seen in Birmingham, I fear there will be disappointment if dependence is placed on that quarter for a large supply of arms, there being neither system"—I may mention that system is the principal thing I have referred to—"nor adequate machinery in that business. System, and special machinery on the copying principle, introduced into the gun manufacture, would completely revolutionise that branch of industry, not only to the advantage of the public service, but also as an item of national trade." This remark was made at the end of a very long paper on Laboratory Articles.

339. What was the date of that?—The 28th of September.

340. In October last, were you required to report on the manufacture of bayonets?—Some time in the month of October I had an order from the Board to proceed to Enfield to see if bayonets could be manufactured there; and after reporting on the state of Enfield, and the facilities that were likely to be obtained there to produce bayonets, the following remark occurs: "That there is also much to be done at Enfield in improving the gun manufacture; a large number of machines are much wanted, both for musket and rifle making; indeed, nothing less than the introduction of self-acting machinery to produce the several parts composing a gun will give satisfaction." That remark was just made incidentally on the Bayonet Report.

341. Have you ever visited Colonel Colt's manufactory?—In the month of December 1853, the Master-general and the Board were very anxious to use anthracite coal for some purposes in the Arsenal, and we had heard that they were using it at Colonel Colt's through the coal merchant. I said that I was very anxious to see the work, and I received an invitation, and I went up and saw the manufactory. Then deeming what I saw to be of the highest importance to the service, I considered it my duty to report the condition of that establishment for the information of the Master-general and Board. The following are extracts from the report which I submitted through my superior, Colonel Chalmer, to the Master-general and the Board on that subject: "Having previously heard of American machinery for small arms, I went to Colonel Colt's factory with high expectations, and in the hope of carrying away some of their mechanical notions that might be applicable in our own service, and I did not leave with disappointment; but the strange contrivances were so numerous, and many rather intricate, that, although deeply interested, yet of many ingenious applications I retain but an indistinct remembrance." Again, "So far as an old building would admit of, the work in this manufactory is reduced to an almost perfect system; a pistol being composed of a certain number of distinct pieces, each piece is produced in proportionate quantity by machinery, and as each

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each piece when finished is the result of a number of operations (some of 20 or 30), and each operation being performed by a special machine made on purpose, many of these machines requiring hardly any skill from the attendant beyond knowing how to fasten and unfasten the article, the setting and adjusting of the machine being performed by skilled workmen; but when once the machine is properly set it will produce thousands. Hence there are more than a hundred machines employed, many of them similar in principle to each other, although differing in the form of the cutting instruments. There is also much that is new in England, and abundant evidence of a vigorous straining after a large and accurate result, which is well fitted to inspire us all with healthy ideas; indeed it is impossible to go through that work without coming away a better engineer; or if our gun-makers were acquainted with and adopted similar tools, it would rouse the latent energies of that trade into life and vigour." These are two extracts that occur in the report on Colonel Colt's manufactory.

342. Did you, in December 1853, give in a condensed report to the Board of Ordnance on the manufacture of laboratory articles and small arms by machinery?—Yes, that was on the 23d of December 1853. The following remark occurs in the report which I then made: "That the musket is eminently fitted to be made by machinery; and that a suitable plant, fully organised, will pay off the whole capital expended in its erection during the first two years that it is in full operation, out of the saving as compared with the same muskets made by hand. During the first year little good will be done, all the small tools and gauges having to be made; and with all the hands fresh and untaught to their special duty, it will make but slow progress at first. In considering the musket as an article to be made by machinery, we must not look at it as a whole, but make each of its 57 parts a separate study; by so doing most of the difficulty vanishes. Many of the pieces, such as the stock, will have to be the subject of a number of simple machines, each performing a small part, but imparting thorough identity to all. This arrangement secures two advantages and one disadvantage: it allows unskilled labour to perform the operation quickly, and secondly, all the parts which pass through the series of machines are identical. The disadvantage lies in the first cost of having so many separate machines. At the present time there is little machinery in England specially adapted to muskets, for to use the tools of the engineer would certainly prove a failure, because they are intended for general purposes, but there is an abundance of talent in England to produce machinery, if required. In the United States of America a large amount of attention has been bestowed on this manufacture; it would be well, therefore, in whatever we do, to begin at the point at which they have brought the manufacture up to, and I would consider it advisable to have at least a single set of their machines for stocks and locks adapted by their maker to our musket." This remark occurs on that condensed report on the two subjects of laboratory articles and small arms.

343. In January last, was a committee of officers sent into the manufacturing districts?—Yes, they were sent into the country to see how far the improvements which are daily taking place in the manufacturing districts in machinery could be made applicable to the several Government establishments in the Royal Arsenal, more especially with relation to laboratory articles; indeed small arms had not been mentioned as yet. During the progress of this committee, instructions were received from the Master-general and Board to prepare plans and estimates of the buildings and machinery for a small arm manufactory, to be constructed on principles that will secure the greatest economy of labour; the machinery to be the best that the present state of the arts can afford, and the whole to be carried out on a thorough and most improved manufacturing system. During this tour the feeling became strongly impressed on the minds of all the committee, that a great saving would be effected if the admirable system and machinery as seen in Glasgow, Leeds, Manchester and Birmingham were introduced into the production of muskets.

344. From your knowledge of machinery, being constantly engaged in devising machines, have you arrived at the conviction that every part of a musket can be made at much less cost by machinery than by hand?—I am firmly of opinion that every part that is made by hand could be made by machinery, if sufficient attention is brought to bear upon it, and if made by machinery it would be made with thorough accuracy, and very much more quickly.

345. You are of opinion therefore that every part of a musket is so simple as to be capable of being produced by machinery?—Yes. I should mention that there are some of the present parts that have an irregular form, which have nothing to do with the musket, as a musket, neither with its accuracy nor its quality, and that many of these, if I had anything to do with the getting up of the manufactory, I would prefer that they were altered in form; simplified and made more chaste in appearance, and not so crooked as some things are without any necessity.

346. Has machinery been applied successfully at Woolwich to operations analogous to those which would be employed in making a musket?—To a very great extent. During the last 10 or 11 years an immense deal has been done in the Arsenal towards making machines which do the work very much more quickly, and indeed there is hardly any comparison between the way in which it used to be done, and that in which it is done now.

347. Are the operations of those machines analogous to those which would be required for making muskets?—There are none just the very same, but many are very similar in some respects. I have been individually engaged in designing and constructing a great number of different machines which I could name, and the purposes for which they have been used, and the advantages which they secure. For example: a machine which comes nearest to anything here is used for planing cannon between the trunnions; formerly this was chiselled out by hand, and then filed, and there was at least four days' work on it; now, by means of the machine that has been made to perform that operation, a cannon is put in and taken out again within an hour; the lad that watches this machine has to turn the trunnions of another cannon, so that it is produced for less than 10 minutes of wages.

348. Will you describe to the committee the general principles upon which you think that a manufactory of small arms should be conducted?—Before doing that I should mention, that in visiting Birmingham any stranger is much struck with the number of individuals that he meets in the streets carrying parts of muskets on their shoulders, and in other ways; men and women, boys and girls carrying parts of muskets. Now, anyone must be struck with the great waste which necessarily goes on by such an arrangement; carrying the parts from one place to another. Of course the wages that are paid for that comes in in the price of the gun; and I am quite sure that if we had a map of Birmingham, with all the paths through the highways and byeways of that town that the several parts of a musket have to traverse until completed, it would do far more than anything I can say about the advantage of the kind of system that I am just going to show to the Committee by the plan that has been proposed, namely, to have everything connected with it passing consecutively on from one stage to another, never passing over the same ground twice, so that the raw materials which go in at one side shall come out a finished musket at the other.

349. Is the plan which you hold in your hand a plan of the manufactory which you propose to construct for the manufacture of small arms?—Yes, it is; the principal part is a very large room, in which the principal portion of the work is to be carried on. Here we have (*pointing to the Map*) at the back of the manufactory a railway leading from a wharf, with a coal-yard along the back of all the workshops where coal or fuel is required, and we have a smithery, with all the furnaces, rolling mills, and other things that are wanted to produce all the parts of a musket that have to be forged in the smithery, receiving coals through these openings (*pointing to the Map*) into the smithery. Then, beyond the boiler-house, which is also supplied with coals from the yard, we have a brass foundry and furnaces and a desiccating arrangement in it for desiccating wood for gun-stocks. It will be observed that all the preliminary parts for producing a musket are prepared on one side of the manufactory, the coal yard being at the very outermost part; and then comes all the forging and casting and the preparing of the gun stocks. Now, on looking at this plan, the Committee will observe that all the different parts of the machinery are in regular order: barrel machinery, bayonet, ramrod, screw machinery, and so on, and at the end will come the stock machinery. The castings and the stocks will enter at one side, and pass through this great building always in straight lines, and never go back again, just working downwards

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wards through and through, until we come to another side of the manufactory. Here there is a railway through the entire length of the building, and the whole of the things are received at this railway, and those things that have to go to this great building, to the tempering and hardening room for colouring, all come towards that by the railway. The barrels that pass to the proof-house go by the same railway to the proof-house, and then come back again to be finished. The gun stocks come to this side (*pointing to the Map*) and are finished, to be put into the store of parts; and all things, when finished in this tempering room, pass into a store fitted up with bins, according to the form and bulk of the article, as will contain a just proportion of each. Along a raised gallery there will be the men who will set up the muskets, the assemblers, and then by a self-acting machine the muskets will pass into the store for finished muskets. At the back we have the engine-house and boiler-house, with shafting, conveying motion all over the establishment, and it is arranged that the various furnaces, both of the brass-foundry and of the desiccating-chamber, will work into one chimney.

350. Having given a general notion of the plan, will you proceed to describe to the Committee the various operations?—There are some remarks in a paper which I have here of very great importance as regards the production of the manufacture, which I had better read, "In devising and arranging the plan of a new small arm manufactory, considerable attention has been directed to the great importance of having all the operations consecutive, in order that the material may not have to be conveyed from one place to another unnecessarily, nor have to go over the same ground twice during the period of their manufacture. Another leading feature in the proposed factory is the principle of having almost all the operations carried on in one room, instead of having the several branches in separate workshops. Any departure from having all the operations carried on in one room arises from the peculiar nature of that process rendering it inadmissible into the general factory; such, for example, is the smithery, where the wrought iron and steel articles are forged from the raw material; the brass foundry, where the several castings of a gun are made; and also, the room where the hardening, case hardening, tempering, browning, and colouring goes on. In all of these departments, the heat of the furnaces, together with the dust and smoke, would interfere with the nice operations and machinery of the general finishing room. An examination of the accompanying plan will show the general order of the proposed arrangement, the whole of the works being on the same level. At the back of the factory, running in a line with the smithery, boiler-house, and foundry, is the coal yard, to be supplied by railway from the wharf. The smithery, where the barrels, bayonets, ramrods, and other forgings are prepared, will contain the necessary furnaces, forges, rolling mills, and other forging machines, some of which will be driven from the steam-engine of the manufactory; but the greater number will be worked from the waste heat of the several iron furnaces, by the employment of stack boilers; in other words, a steam boiler forms the chimney of the furnace in which the iron is heated. The smithery is a room 235 feet by 60 feet. From the smithery the several forgings will pass out into the great room, and will have to work their way in a straight line to the other side of the factory, by passing through one machine after another until completed. On the other side of the steam boiler house is situated the brass foundry, and the furnaces of the desiccating rooms, in order that one tall chimney may serve for the three departments. The brass castings from the foundry and the seasoned gun stocks from the desiccating chambers will pass into the manufactory, and pass through the several machines across to the other side; and in the progress of the different articles from one machine to another, they will be subjected to constant examination in order to detect any error that may arise, either from wearing of the tools or other causes. This room is 500 feet in length by 180 feet in width, and will be covered over by what in Lancashire is termed the 'saw roof,' from its resemblance to the edge of a carpenter's saw; the sloping side of the 'tooth' is slate; the other side is glass, and so constructed as that all the windows face the north, thus excluding the sun's rays; at the same time affording a perfect flood of light all over the manufactory. This roof will be supported on iron pillars, which will also carry the shafting for conveying motion, and the steam pipes for warming. A large workshop

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PLAN OF SMALL-ARM MANUFACTORY

RAILWAY FOR FUEL

Coal Yard.

Timber Yard.

Smithery.

Engine House.

Boiler House.

Brass Foundry.

Chimney

Dessicating Furnaces.

Dessicating Chambers.

Store of Gun-Stocks.

Barrel Machinery.

Bayonet.

Ramrod.

Screw Machinery.

Sights & Nipples.

Machine Repairing

Lock & Trigger.

Band Machinery

Side Cups &

Guards, Nose Caps, and Heel-plates.

Stock Machinery.

RAILWAY TO PROOF HOUSE.

RAILWAY.

Assembling Bench.

Tempering and Browning &c.

General Store.

Gunmaker's Office.

Engineers Office.

Pay Office.

Offices.

Inspectors Office.

Time Office.

Store of Parts of Muskets.

Store of Finished Muskets.

Scale

20 15 10 5 0 20 40 60 80 100 120 140 160 180 200

William Jolliffe
Chairman

John Anderson
Engineer
Royal Arsenal.

workshop is found to be the best preventive of idleness, by having all in the presence of each other, and it reduces the cost of superintendence. As the several articles, such as barrels, bayonets, stocks, locks, &c., reach the other side of the factory in an almost finished state, they will be taken up and conveyed by rail to their respective places. For example, the barrels will pass on to the proving-house, and most of the others to the tempering-room to be completed for store. As the articles are finished they will pass by rail into a store-room, where they will be subjected to a most rigid examination; after which they will be deposited in tiers of such dimensions as will correspond with the bulk of the article. In a line with the railway, but on a raised gallery or platform, the men who set up the musket, termed 'assemblers,' will be supplied with the several parts from the store, and who will there connect them together into muskets; and from this gallery they will pass into another store as finished arms. There are two steam engines, each of 50-horse power, of the double cylinder construction, in order to economise fuel. Five steam boilers, one of which will be used for warming the building in cold weather; for there is nothing better fitted to keep men in good working order than a light, clean workshop at a genial temperature. The motion is distributed over the works by shafting, as shown in the plan, namely, one shaft through the entire length of the room, from which the motion is transmitted by 24 transverse shafts, each 160 feet in length. The manufactory will be fitted up with fans to extract the dust from all grinding processes, and everything will be done which will tend to promote production, or add to the comfort of those who are employed."

351. Will you describe the various operations which are to be performed by machinery, and contrast them with the mode of performing the same operations at present, beginning with the barrel forging?—The system that will be adopted in forging the barrels will bear a considerable resemblance to the more improved system that is now going on in Birmingham. The only advantage that we may expect to gain by what will be done in the new manufactory will be this, that it will be conducted on very much more economical principles. I may mention that, in the present manufacture of those barrels, the whole of the heat which is used to heat the iron, so as to enable it to be made, passes through a chimney into the atmosphere. In the first place, we shall use the whole of that heat to generate the steam to roll the barrels. In some of the works that I saw in Birmingham the steam boilers were in the open air, and uncovered by anything to keep the atmosphere from acting upon them, thus wasting the fuel. Another advantage will be this, that every individual who has done one part of a barrel will only do that one part; the man that bends will not weld, and the man that welds will not elongate; separate rolls will be had, independently of others, for each separate process, and in this way they will be made a little cheaper (as there will be a saving of fuel), than in the way that they are now made.

352. Next with regard to the system of bayonet forging, will you explain that to the Committee?—I hope there will be a very great improvement in the bayonet-forging process, although the method of making a bayonet in the new way is not determined on; it hinges between one of two ways, and it is just undecided whether it is to be made out of one piece of material all steel; that depends upon the authorities consenting to it; if so, we should get into communication with some steel maker, so that he should produce the steel in a certain shape. I may mention to the Committee that a peculiar form of steel would be worked out into a bayonet wholly of steel. This bayonet (*producing the same*) is made with a socket of iron, and the remainder of steel, and if that is the way in which they are to be made, they will be made something in the way in which I will describe, which is very different to the mode pursued in Birmingham. In the first place, we would have a machine to cut off pieces of three-cornered steel, at a definite length, containing as much as would be sufficient for the neck and the blade, and then by a machine, known as a forging-machine, of a peculiar construction, which has been sketched out almost recently, a piece of steel would be heated at one end and drawn under a hammer that would knock it into a particular shape, and then that piece of steel would be welded to the end of a bar of iron; and after that, with the heat upon it, it would pass under Ryder's forging-machine to finish the neck. During that time it would be straight out from the socket, and as soon as

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the neck was finished, it would then pass into a kind of American furnace, which is particularly well fitted for work of this kind. The heat would be taken over a length of about six or eight inches, and then by means of Ryder's forging-machine, this blade would be almost worked out to the finished dimensions, not quite. After that was done, this part (*pointing to the bayonet*) would be again heated; and, by means of the American drop, a sort of thing with four hammers with four sets of dies, this end would be put in under one and another, under the third and under the fourth, which would finish it. Then by means of oscillating steel dies, cut out to the exact form of a bayonet, they would roll about in this way (*describing the same*) three or four times, until it was brought close upon what it is now, though not quite, and that is the way that the forging would be done.

353. Would the bayonet so produced be as good as the present one?—There would be no difference in that respect.

354. Will you contrast the system of lock-making as proposed by your machinery, with the mode which is now pursued?—I do not know that there would be much difference; but the advantage would be on our side, inasmuch as we would have that American tool for knocking them off with the dies, which is the most perfect thing that I have ever seen; far superior to anything that I have ever seen connected with forging small articles. It is a very simple and a very cheap sort of machine; it is always ready to give a blow and to knock a thing into the shape that is wanted. The iron is laid underneath, and the machine holds four of these, and it is just to give a blow to one thing after another so as to bring it almost to the shape required. There must be very little difference.

355. To perform that operation, unskilled labour would be sufficient, would it not?—It would require a thorough man of skill to take the lead of all these forging machines, to see that the dies were in good order, and everything suited to do the work.

356. With regard to the system of casting which you intend to pursue; will you describe that to the Committee?—There would be a great improvement in that; during the strike of engineers, the year before last, some of the manufacturers in the North were driven to introduce what is called the stereotype system of casting, by means of which a boy will do more work than any two men that could work in the ordinary way; there is very little difference between that and the ordinary mode, but it is sufficient to enable one to do the work of several; I will first describe the present way of casting. The pattern of a thing is made like the thing that is wanted; a part of it is rammed into the sand, and some dry sand is put in to form what is called a parting; then another box part is put down with more sand; this is lifted off, and the pattern is taken out of the sand, leaving a vacancy the shape of itself, and the liquid is poured in; but the substance of this depends very much upon the hardness with which the sand has been rammed, and in the niceness with which the boxes that contain the sand are put togther, and the consequence is that sometimes the castings have fins upon them, projecting parts, and other roughnesses, which have to be taken off, and the castings have always to be made larger than what is wanted. But by means of this system, almost perfect castings, or very nearly so, are produced in consequence of having a thing of this kind. One half would be attached to a perfectly plain plate nicely got up, and one half is upon that plate; then, upon the other side of this plate, or some other, there is a corresponding half, and the boxes containing the sand are fitted to these with the utmost niceness, and the various holes that keep the thing in its right place are put in with equal accuracy to that with which a gun is put together. In putting it down, they have merely to ram the sand in without any parting; it is lifted out, and a series of these for one side are laid down, and then it is turned, and another series laid down, nothing depending upon whether the pattern has been rammed in harder or more or less. Much depends in the one case upon the skill of a man in taking it out, and whether he rams it much or little; but nothing depends upon him here. When those two boxes are put together perfect castings are produced; indeed, there is hardly any comparison between castings by the one mode and the other, and though the expense is considerable, still the saving is immense, where there is much to do.

357. How many castings are there about a gun?—I think about six all together;

together; there is the heel plate and the guard, the two side cups, the nose cap, and a part of the trigger; I think six.

358. Will you proceed to contrast the present system of stock-making with the one which you propose to adopt in your factory?—There would be a very great difference there. So far as I have seen, although I am not quite certain that this is the case, yet I think there is comparatively little to assist gun-stockers in preparing guns at the present time in England; at least I have not seen it; I have seen nothing beyond the ordinary tools of good workmen, to facilitate the cutting out of the several parts. Now a gun in itself is a sufficiently definite thing, and there would be no difficulty to make tools to chisel out all those parts, by tracing a copy of the part required. If we were to make a single machine, it would be very difficult and complicated; but if we make every portion the object of a separate machine, so that a tool adapted for a particular part will trace a copy of that particular part, and cut it out, then it would not be so difficult. It would be difficult to do it with a few machines, but with 17 or 18 or 20, of course a stock would come from the machine just the same as the others. It would take a long time to devise all those machines, but I have no hesitation in saying that I think they could all be made in this country very readily. If they are done already, there is no use going over the same ground and time in making them; no doubt they could be done, every one of them.

359. You have no doubt that you could produce those machines?—I think they could be produced quite readily. If you look at the thing as a whole, it is a complicated looking thing, but just to take any separate part, it then becomes quite a simple affair.

360. You have described what may be considered as the preliminary operations for procuring forgings and castings; will you describe the finishing operations which you propose to carry out in your factory, beginning with the barrels?—We are in communication with a tool-maker, second to none in the world, and he is, and we are, strongly of opinion that a more definite system of producing barrels altogether might be obtained than the present. I may just say that now the barrels, so far as I have seen, are bored, and then turned, and bored again; but after they are turned, they are put into a lathe, and marks made upon them to show how much they are out of truth; then they are taken to the grinding-stone, which is a very rude way, and ground down to truth; and then, after the outside is filed, it is worked up into the very perfect thing which we find it. It is very perfect, and it would be very difficult to beat it; but the utmost effort will be made to produce barrels from a self-acting lathe, not by a system of broaching it out, with square pieces of steel, working it out to a round form; and its great length produces straightness. Then the barrel is brought to straightness by a man striking it with a hammer. We may not be able to produce a perfect barrel without the straightening; but it is the opinion of some whose opinions are worth having, and one of the best in Manchester thinks that a perfect barrel may be made without straightening. If we could produce a barrel very nearly perfect with a little amount of straightening, we should be very glad; and I have no doubt that great improvements will be made in the production of barrels.

361. Next with regard to the finishing of the bayonets; will you describe what your proposed plan is?—There will be a greater improvement in that than in the other. I was never more surprised at anything in the mechanical way than at the way in which, in Birmingham, I saw the ring that goes round finished; it was not in one of the first shops, but still it was in a large contractor's shop. A workman was holding the ring in his hands, and forcing it against a boring instrument in a foot lathe. Now one could hardly imagine that in this age such could be the case, instead of holding it in an iron hand, with plenty of power to push it through. The way in which we propose to finish them is this: they are now ground out with grindstones, but we shall have a frame containing a great many of them, fitted with circular cutters revolving slowly, and the bayonets just passing under the cutters, and describing such forms as will produce a perfect bayonet; after that is done, the lot will be turned round into the same machine; then there would be two cutters, the one on the one side, and the other on the other, and we shall produce by this

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arrangement a bayonet that will shade. I have seen some rejected that were not straight, but we shall produce them with perfect straightness. After this they will be tempered and polished, and finished, but we shall have every facility for polishing them with a very high speed. I should mention that the grinding process should be done away with if possible, because it is dangerous; many accidents have occurred through the breaking of the stones. Doing the work with stones is a very rough method, and definite cutting is very much better, though not so cheap; but when you come to have tools self-acting, and a great many working at the same time, that makes it cheaper, and produces accuracy. At the present time they are forged as a socket; we propose to forge them as solid, and to have a series of horizontal pipes revolving, and each of those pipes will hold a bayonet; that is, the bayonet will be stuck into the inside of it, then the drills, which form a row, by a self-acting motion, while these things turn round, will work their way through; meanwhile a man is changing and attending to another lot. After the drilling, they will pass to another machine, to make every hole of a definite size, and after they are bored, they pass on to a series of machines, self-acting, for turning them, and the irregular form at the end will be brought out by tools that will be used, tracing a copy into the proper shape. I saw some of these recesses taken out by hand in Birmingham, chiseled out and filed out, but that would all be done by the circular cutter, and they will be produced very much faster, and all the same; there is no doubt about that.

362. With regard to finishing locks, will you describe your intended plan?—There will be a very great saving in that part of it. I have no hesitation in saying, that there is nothing definitely arranged as to that; but I will state the general principles on which that will be done. They are on the copying principle; a copy of the thing will be attached to the machine that produces it, and if it is a straight line or a flat surface, that surface or line will be contained in the machine. Again, in anything in which there are many holes, for example, this lock-plate (*exhibiting the same*); at Birmingham I heard of a celebrated firm who had introduced machinery for this purpose; but I saw that they had only two or three of our engineers' tools that are not at all adapted for gun-making, because they are made for general work, and are not special tools; nothing but special tools will do the thing quickly. They had one of Mr. Nasmyth's cross-planing machines planing some part of the lock, five-eighths of an inch in breadth; the plane was moving about four inches, and if that had gone at a right distance, it could have been driven at a speed that would have done four or five times as much work. Then, at the same works, they have drilling machines for producing holes. This was an engineering tool, and had but one drill. In this part (*exhibiting the same*), there are five or six holes, each of which requires a tool at a different speed, and to make them at the greatest possible rate, instead of a drilling machine having one drill. It ought to have one or two various-sized drills that should be pushed one after the other, without shifting anything, through the holes through which the several drills could pass, and it could not be done wrong. I may mention that I had thought of this before, but this is Colonel Colt's plan of having his drilling machines with a number of drills, each going at the right speed, and a special drill for each hole. It is very difficult to make a cock of this shape, but there is no reason why it should be of this form. If the part on which this (*pointing to the cock*) works, where it is attached to the other, bore the same relation to the other, it might be of any form, and this might be a plain thing. If it was required to be ornamental, there is no reason why any ornament should not be put on it; but all the curves of this differ; there are not two alike. To do this by hand is easy; but when a machine is to be made to produce these curves, it takes a machine with a great many movements about it; but there is no reason whatever why it should be of this form. I should say, Alter this; make the lines nearer straight lines, or, if curves, let them be all one curve, or as near as possible. By having two or three curves, the thing could be produced at a moderate cost, and, if done at all, it should be altered from this shape.

363. Have you considered what alteration should be made?—I would make no alteration so far as the gun is concerned; it would be merely to simplify the

the thing to make. There is no other part very difficult about a gun. I think the main spring is one of the next difficult parts. I do not know anything about a gun; but I think this might be very much improved. It might be difficult to make this, as it would be rather tedious; but I think a spring could be made much more easily than this (*exhibiting the same*), if it is to be made by machinery. There is a little thing attached to this called a swivel, which makes a very nice lock; but I think there are some that are better. Instead of having a swivel between this (*describing the same*) and the part that it is connected with, there is a sort of roller, and if that was introduced instead of a swivel, which is very complicated, but can be very readily made by machinery, it would be better. This little thing (*exhibiting the same*) is connected with the part that it acts upon. Now we can easily produce this little thing, though it would be very much more expensive to make than if it was a roller; a roller would answer the purpose equally well. Speaking as a mechanic, and not as a gun maker, it could be very much more easily made. If this is to be made as now, I would get into communication with some steel maker, and ask him to roll bars of steel of a certain shape, thin in the middle, and thick at each side, and then, by a clipping machine, I would clip them off to the right length, and cut these studs. If you look at this, it has the appearance of the letter S. There is no occasion for that, if there was a right line between the two parts, it would make a much cheaper lock, and equally good, in my opinion, in another shape.

364. You could produce it as it is by machinery?—Yes.

365. You think that you could improve it?—Yes, I could make it much more simple, and to do its work equally well as a gun, without pretending to know anything about a gun, except as to the mechanical arrangements of the lock.

366. With regard to finishing castings for attaching to the musket, how do you propose to do them?—They would all be done on the copying principle. Here I would require a few alterations. This form (*exhibiting a casting*), and I have examined it minutely, is composed of an ever-changing series of circles. I would have it one circle; it would look as well, and would not cost a fraction of what it would to produce this. But by having a circular cutter, copying the form of this, tracing this circle one curve, producing this, and coming over here (*describing the same*), it would do it very quickly. The same with this thing. If this is examined minutely, it will be seen that it is all changing, no two circles are the same. I would make all of the same curve; but by introducing any given curve, and tracing a copy of this, the thing would be produced by machinery as easily as possible; in fact they could not make it different from the form required. As to making the screws, and many other parts, I do not know that there would be much difference from the present way; but we would use the screw machinery, such as they use in Birmingham for wood screws, and good lathe screws for more particular screws.

367. As to finishing the stocks, what is the plan that you propose?—I have only to say, that we would use copying machines for the whole of that.

368. You have described the principal operations for procuring forgings and castings, and you have described the finishing operations; will you describe the system of hardening, case-hardening, tempering, and colouring?—That would be conducted in a building specially prepared for it, and the furnaces for hardening and tempering would be on a large scale, like they are in some of the departments of trade in Birmingham. I have seen exceedingly good furnaces for tempering things so that they cannot be injured; furnaces that cannot get above the right temperature, and with every facility for producing things in large numbers and thoroughly correct in quality. And we hope to save here by having unskilled labour trained to do one operation, always sticking to it, and having it under the superintendence of some highly skilled in all the branches.

369. Having completed the formation of the separate parts of a musket, what is to be done with them when finished?—I should have mentioned that the things in passing across this great room (*pointing to the plan*) would be subjected continually to rigid tests of their accuracy, because the wearing of the tools, and othes causes, will involve a change in the dimensions unless

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that is rigidly looked after. Indeed, it is a most important thing to test things as they come forward from stage to stage; they would come to the tempering-room and become finished things, and pass on to the store of parts, and from this, by a self-acting arrangement, pass along by a railway to the gallery, to the assemblers, where they would be set up.

370. Do you mean the setters-up?—The setter-up of a musket has a great deal to do to it, but the assemblers would only have a few minutes' work on it. If we are to believe all that is said about the American Government, by the Commissioners sent over, and from an article which I saw in a magazine some years ago, it would appear that the setting-up of a musket there is a two or three minute operation; suppose it takes 10 minutes, it would be merely screwing the parts together. I propose, according to the ability of a man (the assembler), that he shall have the parts served out to him for the day, and that he shall put those parts into a musket, and then when finished, they shall pass by the railway to the store of finished muskets.

371. Have you any doubt that the parts of a musket can be created by machinery so perfect that the assembler will take so short a time as 10 minutes in putting them together?—I have no doubt that, after a little experience, there will be very little doubt on that point: but it will be very difficult to do at first. We must begin with parties who know hardly anything about it, except a few leading hands, whose work will be trying to get others to see to the necessary accuracy. It is a work of time to get those engaged in it to become accurate; when once that is attained there need be no doubt.

372. You have no doubt that ultimately sufficient accuracy can be produced?—No; but not at first.

373. Have you made any estimate of the cost of erecting a manufactory of the kind which you have described, supposing it to be for the production of 150,000 muskets and bayonets a year, or 500 a day?—Yes; but I have no hesitation in saying that we have done so in many cases with comparatively little data. We do not pretend to anything that is not real in this case. We have been in contact with the parties who are to make the things, but who hardly know definitely what it will cost. With regard to a great deal, it is only a probable estimate, and I give it with caution, so far as the probability of the estimate is concerned; but I should mention, that in every case it is much above what I think it will be.

374. Have you endeavoured to make a covering estimate?—Yes, I have done that; but I would read it, with the remarks I have made accompanying it.

375. Do you suppose that your estimate is probably too great or too little?—I think the estimate which I am going to read is considerably above, but I still give it with caution. The foundations of the buildings (for it is not a very good foundation that we are going to work upon), together with the buildings, chimnies, and brick-work of the furnaces will cost somewhere between 47,000 *l.* and 50,000 *l.* We know that very nearly, because that has been gone minutely into, and we are in contact with the contractors about it, so that it is not very far from the truth. It will be between 47,000 *l.* and 50,000 *l.* I will call it 50,000 *l.* We have been in communication with respect to most of the next lot; two steam-engines, steam boilers, shafting, warming apparatus, rolling-mills, iron-work of furnaces, high-pressure engines to work the rolling-mills, stack-boilers, pumping engines, straightening presses, forging machines, American drops, iron-work of forges, oscillating die machine, and other small tools, 25,423 *l.*, and, with the exception of the American drops and two or three little things, we know that the price of those things is not far from being correct. But the next is only approximate: finishing machinery for stocks, barrels, bayonets, ramrods, locks, sights, bands, screws, heel-plates, guards, and nose-caps, nipples, side-cups, and other tools, 68,590 *l.* I have with me a detailed estimate of how this is made up; I can read the sums (though I do not know that it would serve any purpose) set apart for each. I think the Committee will consider the estimate as high, and I think it so myself, but I would rather take this sum than a smaller one, namely, 68,590 *l.*

The *Chairman* stated that the Committee were of opinion that the witness should give in an estimate in detail both for the sum of 25,423 *l.* and 68,590 *l.* for the finishing machinery.

376. Colonel *Maule.*] Are the Committee to understand that yours is only an approximate estimate?—Yes, only.

377. *Chairman.*] What is the total sum at which you estimate the cost of the manufactory?—£. 150,000, at the very outside.

378. What do you estimate would be the cost per annum of keeping the machinery in complete working order?—I have put it down at a very large sum, and I think that any one who knows anything about factories will say that it is very large; I have put it down at 10,000 *l.* a year to keep the place up to a given mark.

379. What number of workmen do you estimate that you would require to produce 150,000 muskets a year, or 500 a day?—I have gone over the several portions of the work to be performed in producing 57 parts, together with putting them together, and I consider and calculate that it will be under 900. I will call it 900, but to keep up the plant, and to keep the larger machinery and machines in order, together with cutting tools, and so on, I have put down 100 men extra, or 1,000 individuals together. About 150 would be men of considerable skill, and the remainder would be men of moderate skill, labourers, boys or girls taken on without skill, but being trained to a single operation would become highly skilful at that particular process; 150 would be men of considerable skill, and they would graduate, according to the nature of the process, lower down in the scale, but they would all become skilful at that particular process, and it would be very simple to most of them.

380. What would be the annual wages for these 1,000 workmen?—It is rather difficult to say anything definite on that, but I have gone into it, and I think my calculation is not very far from being what it will be. Assuming that 1,000 is the probable number employed, it is probable that the wages per week would stand nearly thus: 1 man at 5*l.* per week; 2 men at 3*l.* per week; 5 men at 50*s.* per week; 20 men at two guineas a week; 25 men at 36*s.* a week; 25 at 30*s.*; 50 at 24*s.* 6*d.*; 72 at 18*s.*; 100 at 15*s.*; 100 at 12*s.*; 150 at 10*s.*; 150 at 8*s.*; 150 at 6*s.*; and 150 at 4*s.* (the latter would be, of course, boys or girls); altogether amounting weekly to 621*l.* 11*s.*, or annually to 32,339*l.*

381. In that sum, do you include the 10,000 *l.* a year for the wages of the 100 persons that you would employ, in keeping the machinery in repair?—Yes, they are included.

382. Mr. *Geach.*] It includes the 10,000 *l.* a year, does it not?—Yes, it includes the wages of the 100 men.

383. And the 100 men are included in the 10,000 *l.* a year?—Yes; I think there would be about 1,000 required altogether; about 100 of the 1,000 would be required to keep up the plant, more especially to cut the cutters to the right dimensions, and sharpening them; the other 900 would be employed in producing the parts and assembling the muskets.

384. *Chairman.*] Do you estimate that the wages of each of those 100 men would be 100 *l.* a year?—Yes; that is of course merely an approximate estimate. I think it comes very high, and if I were to reckon by what it costs the Arsenal to keep things up to the mark now, it does not approximate to anything like that to keep the tools in order.

385. With regard to the other expenses of the manufactory, what do you estimate would be the cost of the fuel required?—The two steam-engines are about 50 horse power. Suppose we work them up to 60, and use from 3 ½ to 4 lbs. of fuel per horse power per hour, which such engines will work; they are of the double cylinder construction; about 2 ¼ tons would be required per day. For the furnaces 8 tons would be required per day, and for the forges 4 ¾ tons, altogether about 15 tons of coal per day; equal to 4,500 tons per annum, which will cost from 4,000 *l.* to 5,000 *l.* According to the former contracts in the Arsenal, they would cost from 4,000 *l.* to 4,500 *l.*, but with coke and wood I have put it down for about 5,000 *l.* for fuel per annum.

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386. We are proceeding upon the supposition that you will make 150,000 muskets in a year; what would be the cost of the raw materials of those muskets, taking them at the present price of the raw material for muskets?—I must say that that is a subject which I have not gone into, but I happen to know the price of the present materials, and I should say that they will cost us less, for several reasons, one being that we will get them in rather an earlier stage, at least some of them, the wood screws, for example; and we would get the brass castings in an early stage. The cost of bringing them forward to the state of castings and screws I have given already in the wages; but with regard to the price of materials now, the iron costs 3*s.* 6*d.*; steel, 1*s.* 6*d.*; brass, 1*s.*; stock, 3*s.*; and then come several items, coals, oil, grinding-stones. I have given the coals already, and a part of that is to be deducted; that is 1*s.* 3*d.*, or 10*s.* 3*d.* per musket, but I have put it down at 10*s.* 9*d.* Supposing we have it at a stage earlier, and supposing 150,000 muskets at 10*s.* 9*d.*, which is 6*d.* more than at present, that amounts to 80,625*l.*

387. Have you at all estimated what the cost of the establishment of the factory would be, independently of the wages of labour?—There happens to be an establishment in the Arsenal with nearly the same number of individuals, and a far greater variety of work going on in it; and assuming that that is something like what this might be, I have estimated this at 2,500 *l.*, which is several hundreds above the other. I am referring to the carriage department, which is something smaller, about 2,200 *l.* I have estimated this at 2,500 *l.*, but of course I have no authority to do this.

388. Have you made out the total annual cost on the supposition of 150,000 muskets being produced per annum?—I have done that, but of course I give that without much authority. I have supposed the interest on the plant at 5 *l.* per cent. equal to 7,500*l.*; labour of 1,000 persons, 32,339*l.*; fuel, 5,000*l.*; materials of 150,000 muskets, 80,000*l.*; establishment charges, 2,500*l.*; contingencies, 10*l.* per cent., I have put down, or 12,733*l.* altogether, making an estimate of 140,072*l.* In going over these items I cannot see the way to make them larger. I have no wish to make the cost appear less than it is in any way. I think the items are all on the outside, unless it is the coals, which seem to have got up higher than this; at the present moment they are higher.

389. That would give how much per musket?—Taking 140,072*l.*, that would produce 150,000 muskets, and that seems to come to less than 1*l.*, which is so very small. I believe the first 150,000 will cost a great deal more than this; probably double what they will cost ultimately; I should say from 35*s.* to 30*s.* The first will probably cost 2*l.*, but gradually, month after month, they will get cheaper, as the individuals do the operations better and quicker, and after making 150,000 I think we shall get them down to something between 20*s.* and 30*s.*, supposing every one in the manufactory does his duty. There are many in a manufactory who do not, and who fall into slovenly ways, but just making every kind of allowance, I think it will be somewhere between 20*s.* and 30*s.*

390. Colonel *Boldero.*] You have no knowledge with regard to the wear and tear of a musket made entirely by machinery?—Not the very smallest.

391. Colonel *Lindsay.*] You spoke of the several parts of a musket, and of certain curves which would not suit machinery. Have the alterations which you propose ever been submitted to the Board of Ordnance to ascertain whether they were practicable?—No, not at all.

Martis, 14° *die Martii*, 1854.

MEMBERS PRESENT.

Sir William Molesworth.	Lord Seymour.
Mr. Monsell.	Mr. George Dundas.
Mr. Muntz.	Colonel Lindsay.
Colonel Boldero.	Mr. Geach.
Lord Paget.	Colonel Dunne.
Mr. Walpole.	Mr. Newdegate.

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Lieutenant-Colonel *Tulloh*, R. A., called in; and Examined.

Lieut.-Col. *Tulloh*, R. A.

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392. *Chairman.*] WHAT office do you hold?—I am Inspector of the Royal Carriage Department.

393. How long have you held that office?—About six months.

394. What office did you hold before?—I was inspector of gunpowder at Waltham Abbey, for 12 years.

395. Are you acquainted with machinery generally?—Yes, I am.

396. Is there a large quantity of machinery in the carriage department at Woolwich?—Yes, there is.

397. Have you had experience of machinery at Waltham Abbey likewise?—I have.

398. What number of men are there in the carriage department at Woolwich?—We have about 870 at present.

399. Taking the average rate of wages of those men, what would it amount to in a year?—£. 54,462 The average wages is at 4 *s.* a day per man. We have a great quantity of machinery in the carriage department, and that machinery turned into labour would amount to 400 workmen, which 400 workmen, at the average rate of wages, would amount to about 25,000 *l.* per annum.

400. That is to say, you estimate the machinery employed in the carriage department as equivalent to 400 men?—Just so.

401. The average rate of wages of these men would amount to 25,000 *l.* per annum?—Yes, in round numbers.

402. What capital would that sum represent?—At 3 *l.* per cent. it would amount to about 833,000 *l.*

403. What was the cost of that machinery in the carriage department?—Up to this time it has been rather under 20,000 *l.*, including steam engines.

404. When was the machinery introduced?—The greater part has been introduced within the last seven years, by Colonel Colquhoun. I think about that time.

405. What is the sum that has been expended on machinery?—Rather under 20,000 *l.*

406. Lord *Seymour.*] You mean, in obtaining it?—Yes, the actual cost of the machinery; on the plant.

407. Do you mean the cost in 1847?—No; from 1847 down to this present time.

408. *Chairman.*] The total cost of the machinery from the commencement to the present time, has been 20,000 *l.*?—Yes.

409. Mr. *Monsell.*] You mean, that the cost of all the different machines erected since 1847, has amounted to somewhere about 20,000 *l.*?—Yes.

410. Lord *Seymour.*] Will you state what the cost was of obtaining the machinery, and then the cost of maintaining it afterwards?—I cannot tell that.

411. Mr. *Monsell.*] Can you state what the cost has been of maintaining the machinery since you have been in the carriage department?—No, I cannot at this moment.

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412. *Chairman.*] Have you visited Colonel Colt's manufactory for pistols?—Yes, I have.

413. Will you describe to the Committee the impression which that machinery produced on your mind?—I visited his manufactory previously to anything being settled about Government small arms, and I was highly gratified at the description of machinery which I found there in operation. In fact, it was something so different from anything I expected, and so beautiful, that I, like everyone else who has seen it, was highly gratified. The consecutive arrangements of the machinery were such as I have never seen in any department before. There were, I think, about 150 machines at work, and those machines were all placed in a kind of consecutive arrangement to produce the pistol of which Colonel Colt is the manufacturer. It seemed to be a kind of stream of work flowing through the manufactory in consecutive order. The arrangement for forging by the American drop machine was both economical and simple; and he had introduced also an English machine, called Ryder's Forging Machine, which facilitated very much indeed the forging of the barrel of the pistol, and that seemed to be almost all that was used in that particular part of the department, in the forging and stamping out the different parts of the pistol. I believe there are about 150 machines employed in making that one pistol, as well as a certain portion of hand labour; but the hand labour appeared to be very small, and you could see boys and girls working, some taking charge of, and working two or three machines together, the girls attending to the rifling and boring machinery; so that it must be done on a very economical principle.

414. Have you any other observations to make on this machinery?—Nothing more than that I understood that the skilled labour and the unskilled labour was about 20 per cent., and the interest on plant, tools, and profit, 80.

415. Mr. *Monsell.*] Do you include materials in that calculation?—Yes.

416. *Chairman.*] Do you think that the description of machinery which you saw used there could be applied to the manufacture of muskets?—I have not the slightest doubt about it.

417. Did you form one of the committee which was sent down into the manufacturing districts?—Yes, I did.

418. Will you state for what purpose that committee was sent into the manufacturing districts?—We proceeded to the manufacturing districts to ascertain how far the great improvements and the recent inventions in machinery could be made available and applicable to the laboratory and other manufacturing departments of the Government, including small arms; and we received instructions from the Master-general of the Board, which I have by me; I have an extract here which relates to small arms: "Submit to the Master-general, that Royal Laboratory Improvement Committee and Mr. Anderson be directed at once to prepare plans for the erection at Enfield of a factory capable of holding machinery adequate to produce 500 muskets per diem. That the committee be informed that the necessary buildings are to be constructed on those principles by which the greatest economy and easiest supervision of labour are secured. That sufficient space be provided to allow of that extension and development of machinery which the rapidity of discovery in this age renders desirable. The machinery is to be the best which the present state of science can imitate or invent; that Captain Collinson and the other gentlemen referred to, are to bear in mind the great importance that the Master-general and Board attach to bringing the proposed factory into work at the earliest period which they find consistent with full and mature deliberation. (signed) *W. M.—T. H.*"

419. Mr. *Geach.*] What is the date of that?—It is dated 24th of January last.

420. Colonel *Boldero.*] Enfield is specified there, is it not?—Yes, it is. "Transmitted to the president of the committee now assembled, that they may at once consider how the views of the Master-general and Board may best be carried out. The committee will not fail to perceive the great importance which is attached to the early completion of an establishment which will secure an adequate supply of small arms to the Government of the country at all times, and under every circumstance, and they will suggest whatever they may deem calculated to effect that object. (signed) *Raglan.*"

421. *Chairman.*]

421. *Chairman.*] Did you, with the view of carrying out those instructions, visit the most eminent manufactories in the north?—Yes, we did. We proceeded first of all to Aberdeen. I was not one of the party that went there. I was engaged at that time elsewhere; but the committee commenced their investigation at Aberdeen, proceeding onwards to the south. This was for laboratory purposes at that time, because it was not till the 24th of January that we received that intimation which related to small arms.

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422. Mr. *Geach.*] Your journey was before that time, was it not?—Yes, about the 19th of January.

423. Mr. *Monsell.*] You started on the 19th, did you not?—I did.

424. When did the committee return?—I do not recollect the date; it was about the 8th or 9th of February. The committee visited the manufacturing towns of Aberdeen, Glasgow, Leeds, Sheffield, Manchester, Bolton, Oldham, Johnston, Birmingham, Paisley, and many other places.

425. *Chairman.*] What was the impression produced on your mind by the visit with respect to the present system of supplying small arms?—I will mention first the names of the firms which we visited, the most celebrated among them including Whitworth, Hibbert & Platt, P. Fairbairn, Hick & Son, Cammell & Johnston, Spiers & Jackson, Gillott, Rider, Messrs. Clapperton, Kittson, Muir, Nettlefold, Shanks, Selby, Collier, Macdowal, &c.

426. What are those firms?—Those firms are some of them makers of machinery; I may say that all of them are makers of machinery.

427. Not makers of small arms?—Some of those firms we visited afterwards at Birmingham. I may mention that we were received by all the manufacturing firms I have named, as well as many others, with the greatest possible kindness Every facility was given to us to see their machinery; and the only regret we had was, that we were rather hurried in our tour, from the necessity of the service for our returning, therefore we did not quite enter in the minutiæ of the several beautiful machines we saw in the manner we could wish; it was quite impossible to do so.

428. Did you when at Birmingham visit the various firms for making small arms?—I did not; some of the party did; I saw the bayonet manufacture and the making of barrels by rolling.

429. Did you form any opinion with respect to the present mode of supplying small arms?—I have formed an opinion with respect to the present mode of supplying small arms.

430. What is your opinion upon that subject?—Having visited those large mentioned firms, joined to the experience I have had in machinery, together with having seen Colonel Colt's manufactory, which certainly astonished not only me, but every person who has seen it; I cannot help expressing the strongest opinion I can possibly give words to, that the machinery which I have seen at Colonel Colt's, together with the beautiful machinery in every direction in the north, has impressed me so strongly, that I do not hesitate to state my opinion that muskets can be produced by machinery quite as well as Colonel Colt's pistols in every respect. I have not the slightest doubt of it, and I believe that the greatest mechanics of the day, with whom I have mixed, will bear testimony to the same opinion.

431. Mr. *Geach.*] When did you see Colonel Colt's manufactory?—It was previously to the proposal on the part of the Government for a manufactory; about a fortnight or three weeks before I left on this tour through the manufacturing districts.

432. Will you state to the Committee what bayonet manufactory you saw in Birmingham?—I think it was Mr. Hill's.

433. Mr. *Muntz.*] Who recommended you to go to Mr. Hill's to see the bayonets made?—I think Mr. Anderson recommended us.

434. Who recommended Mr. Anderson?—I do not know.

435. How came Mr. Anderson to recommend you to go to Mr. Hill's?—I do not know.

436. Mr. *Geach.*] How many men did you see at work there?—There might have been, perhaps, about 10 or 12 men; from that to 20.

437. What other manufactory did you visit?—We went to see Mr. Clive's rolling mills.

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438. *Chairman.*] Was Colonel Chalmer one of the committee?—Yes, he was; he was at Birmingham with us certainly; he is connected very much with small arms, and has been for many years; Colonel Chalmer is, I believe, the president of the Committee of Small Arms, the head of a standing committee, of which Captain Hay and Lord Aberdeen's son are members.

439. Did Colonel Chalmer and you draw up a statement of your opinions on the subject of the supply of small arms?—Yes, we did.

440. This report was before your visit to the north, was it not?—Yes, it was.

441. What is the date of it?—January 16th.

442. It was after your return from the north was it not?—No, before.

443. Will you be so good as to read it?—"In taking into consideration the important subject of supplying small arms for the service of the Government, we beg to offer the following observations and suggestions: It appears that the system hitherto adopted to procure small arms is so heterogeneous in its character, that it could not fail to produce considerable difficulties. The Government establishment at Enfield Lock is comparatively small and of a mixed nature, some part of the work being performed by the establishment, some by contractors; many of the lathes and other tools are the property of the workmen; others belong to the establishment. The men possessing lathes hire them out to other men. The several parts of the arms are made by different contracting parties, and therefore difficulties arise in obtaining that identity which ought to exist either as to the quality of material or workmanship; and in cases of sudden emergency, it is not only difficult to procure the articles in sufficient quantity, but this system is the more prejudicial to the service, from the absolute necessity which might exist of being obliged to take an indifferent article at high price. The establishment at Enfield being small, and forming part of this heterogeneous system, is unable to hold that salutary check or control over the contractors to prevent exorbitant demands and serious delays. The demands of the service must always be guided by the exigencies and emergencies of the times, varying from large to small, and often to even no demand at all. The principal part of the gun trade upon which the Government mainly depends for supply in cases of emergency, is carried on in Birmingham and London, and by men working by hand in wretched cellars and garrets, and the great evil which arises from the extreme slowness of manufacture. Without entering into any further details of the present system of supplying small arms, we beg to state that under the foregoing circumstances, we are of opinion that occasions may arise when very serious difficulties will be found in obtaining anything like an adequate supply for the emergency; there is, in fact, little or no reliance to be placed on the present system, and there is no controlling power in the hands of the Government to prevent exorbitant demands of the trade and workmen. We venture to express our opinion that a great change is required in this important branch of the manufacturing department of the Ordnance; the object being to secure a greater certainty of supply at a less cost. To effect this on a solid and sure basis, we would suggest the introduction of the best machinery which can be procured, to be entirely in the hands of the Government, and on such a scale as will produce the maximum amount of arms which may be deemed necessary for the requirements of the service under any circumstances. The principle of substituting machinery for labour is established beyond a doubt, and its application to the manufacture of small arms can no longer be disputed; but if any proof were wanting in this respect, it will be found by a visit to Colonel Colt's manufacture of the American revolving pistol, and we cannot imagine that anything could bear more strongly on this point. It appears from what Colonel Colt stated, that the amount of skilled and unskilled labour did not exceed 20 per cent. In this manufactory many boys as also girls are employed, and one boy is seen attending two or three lathes or machines. The musket for the service of the British army now costs nothing short of 3*l.*, but if manufactured by machinery instead of by hand labour, as at present, it might be produced for very little more than one-half. The best view of the quantity of small arms which might be required to be kept in store by the country is, that when it became necessary to go from the flint and steel system to the percussion principle, there were in 1839, in the store, upwards of 700,000 muskets, a number which caused considerable embarrassment in coming to the change; and since that time to the present, when we are again altering our system of small arms, the store has never been completed.

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One great advantage to be gained by making small arms by machinery is, that it will be necessary to have a much smaller store, as the numbers made weekly could be readily augmented. Assuming that the diminution of store be 200,000 stand of arms, here is at once a saving on a capital of 600,000*l.*, putting the musket at 3*l.*; and supposing the first outlay for buildings and machinery to amount to 150,000*l.*, how very soon this outlay would be returned to the Treasury, and when once returned, at what a very reasonable rate your small arms will be procured. These calculations are made upon the basis of the wants of Her Majesty's service alone, but should it be contemplated to extend the supply to the East India Company, although the extra outlay would be greater, yet the gain would be proportionably more."

444. In that report you refer to the exorbitant demands which have been made by the contractors for articles; have any cases of such exorbitant demands lately occurred?—Yes, there have lately. Within the last month, I think, or nearly about that time, a demand was made upon the Board for 10,000 boxes, to contain small arms ammunition; and the contractor who had previously supplied them for 6*s.* 3*d.*, considering, I suppose, there was likely to be a war immediately, put in his tender to the amount of 7*s.* 10*d.*; but as my department had large quantities of wood, and machinery for working in wood, the Board immediately wrote down to me to know whether I could make those boxes, and in going into a calculation, finding that our machines would be able to do it, I wrote to the Board to say that the calculations I had made would bring it to about 4*s.* 1*d.* each, consequently the difference of about 3*s.* 9*d.* a box upon the 10,000 boxes, would amount to a saving of about 1,800*l.*

445. Can you hand in to the Committee a statement of that in detail?—Yes.

446. Mr. *Geach.*] The previous price, you state, was 6*s.* 3*d.*?—Yes.

447. When was the price 6*s.* 3*d.*?—I think it was about a year before; I am not certain about the time; the contractor lived in Camberwell, I believe.

448. Were those long boxes?—No; they were small boxes, holding 500 rounds of ammunition each.

449. Timber boxes?—Yes.

450. When you speak of 4*s.* 1*d.*, what price did you take the timber at?—That detail is not here, but I can furnish it.

451. Are you aware that timber has risen something like 30 per cent. in the last 12 months?—Yes, I am.

452. Do you take the price of the timber you had then in stock, or the present price of timber?—I cannot exactly answer that.

453. *Chairman.*] What was the price which you stated the contractor asked for the ammunition boxes?—7*s.* 10*d.*

454. What was the price which you calculated you could produce them for in the carriage department?—4*s.* 1*d.*

455. Could you give in a statement, in detail, of that?—Yes, I could furnish it, with an exact statement of the amount of deal and elm which were used for those boxes, and as to whether it was under the present price of timber, or under an average price.

456. Mr. *Muntz.*] Was it the same timber in each case, in those that he made, and in those that you made?—Yes, exactly the same kind; we furnished the pattern for the contractor; we always do that. This was exactly the same description of timber, and the same description of metal, which was, I believe, furnished from your manufactory.

457. What was the metal used for?—For the screws, and the small plates to hold the screws.

458. Did you make any allowance, in estimating the cost of your boxes, for the general expenses of the establishment?—I think not.

459. Mr. *Geach.*] How did you propose to make those boxes, by machinery?—Partly by machinery, and partly by hand labour.

460. What did you put down for the machinery?—That does not appear to have any distinct part, unless it was included in the converting and making. (1*s.* 4*d.*)

461. How much of that is for machinery?—I cannot tell. I will furnish the Committee with another detail.

462. You have had a return made to you by some one else, have you not?—Yes.

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463. Who gave you that information?—It was given to me by the constructor of the carriage department, on my order to let me know at what price a box could be made, and this is the estimate that he has given.

464. How do you know that he has included the machinery?—That I recollect particularly asking for.

465. Mr. *Muntz.*] You can probably tell the Committee what the machinery was applied to; was it applied to sawing?—Yes.

466. What else was the machinery used for?—There are two small holes, and a small slotted hole into which the piece of metal to receive the screw goes, and the grooving out of the place where the cord goes, and arrangement for hinge.

467. Can you furnish the Committee with a detailed account of all the particulars, the charges, and everything else?—Yes, I can.

468. Mr. *Geach.*] Separating the labour from the machinery?—Yes.

469. There was no charge for superintendence, was there?—I am not quite certain whether the converting and making does not include that.

470. There is no charge for interest of capital?—No, I think not.

471. Mr. *Muntz.*] And no profit is allowed?—The profit would be between 4 *s.* 1 *d.* and 7 *s.* 10 *d.*, I suppose.

472. That depends upon whether your particulars are correct?—Yes.

473. Colonel *Boldero.*] Was there a public advertisement inviting tenders for those boxes?—Yes.

474. Was there only one man who offered?—Yes; he had applied before, and when he gave this tender it was referred to me, and I endeavoured to meet it to the best of my ability.

475. Colonel *Lindsay.*] When was the last contract for those boxes?—I think about a year ago.

476. Mr. *Geach.*] Are you aware that the price of labour has generally risen?—I am perfectly aware that there has been an increase in the market in the price of material, and also in the value of labour; and that was the reason given by the contractor for the great increase he made in tendering for 7 *s.* 10 *d.*

477. With regard to those 10,000 boxes, did you require them very quickly?—Yes.

478. Had you been in the habit of wanting them very quickly before?—Perhaps not so quickly as on this occasion.

479. Do you know whether this man could have made them in the time with the establishment he had?—I do not know that.

480. Are you aware that when work comes in to be done very quickly the workmen have to work overtime, and that they are paid more for overtime than they are usually paid?—I do not know that that is the case; we do not pay anything more for overtime than at any other time; it is just in proportion to the day's work.

481. Your men do not work so hard perhaps as men generally work elsewhere?—I am quite convinced they do; I do not believe that any workmen in any manufactory in the United Kingdom work harder than the workmen in the department over which I preside, and who in cases of emergency have shown a spirit which, I think, is such as would sufficiently gratify any person.

482. Mr. *Muntz.*] Is it day work or piece work?—Day work.

483. Mr. *Geach.*] Do you know whether this contractor did his work by day work or piece work?—I do not know.

484. Mr. *Muntz.*] If all such work is done by day work, this contractor must have done his work by day work?—I do not know; I know nothing about the contractor; it is simply as I have detailed before. I was required to give in a statement as to whether we could do the work.

485. Mr. *Geach.*] Is the carriage department fully employed?—It is very fully employed.

486. How long has it been fully employed?—During the last two or three months.

487. Was it fully employed at the time that this inquiry was made of you?—Yes, as fully as it could possibly be.

488. Could you have done this work, and yet have done all the other work belonging to the department?—Yes, because we took on carpenters for that work.

489. Then

489. Then you had more room than you wanted?—Yes, we had; we could put 20 more carpenters on if we wanted them.

490. Those carpenters would not have increased the power of the machinery, would they?—No, it was occasionally done by taking advantage of the machinery that might not always be employed the whole time.

491. The establishment was not fully employed, and there was time enough to do extra work?—The men were employed extra hours, for instance, in that very thing; we are working sometimes day and night.

492. Mr. *Muntz.*] Not the same men, I hope?—No, not completely, but very nearly; we do not work every day and night.

493. Mr. *Geach.*] Have you a night set, and a day set of men?—No, the men do not work all night, only for a certain time.

494. A man does not rest in the day, because he works in the night?—He works overtime during part of the night.

495. Mr. *Muntz.*] What is the overtime on the average that you work now?—That depends upon circumstances; the smiths have been working up to 12 o'clock at night, occasionally from 7 o'clock in the morning.

496. When you employ the men in that way, do you think you get the same proportion of labour, and as good quality?—No; I do not think it is reasonable that we should; we get a certain amount of labour. We only do this in certain cases; for instance, we have had very pressing orders from the navy; I wish as much as possible to prevent it.

497. Mr. *Geach.*] Did you actually make any of those boxes?—Yes.

498. Mr. *Muntz.*] What quantity did you make?—I do not know; I dare say a third.

499. Of what number?—Of the 10,000.

500. Mr. *Geach.*] How long were you making them?—I think about a fortnight.

501. What time did you allow the contractor for making the 10,000?—I do not know anything about that arrangement.

502. *Chairman.*] Have you a statement of the present price of the various laboratory articles made chiefly by hand labour?—Yes, I have; it is an approximate estimate; it was furnished to me by Mr. Anderson.

503. Have you confidence in the calculations and opinions of Mr. Anderson?—Yes; I have known him for these 12 years, and I consider him a young man of the highest talent, especially regarding inventions of machinery.

504. Has he, to your knowledge, displayed great talent in inventing machinery?—Yes, he has displayed very great talent indeed.

505. Mr. *Muntz.*] In the invention of what machines has his talent been displayed?—First, in the bullet machine.

506. What else?—In several shaping machines for the trunnions of the guns, and turning guns.

507. Can you place confidence in Mr. Anderson, or in anybody else, who tells you that he is confident he can invent machinery, the like of which he has never seen to be used, for a purpose to which it was never applied before, and which shall possess certain qualities of quickness and cheapness?—I cannot fancy any person giving a better estimate.

508. Can you place confidence in any man who makes such a statement as that?—Yes, I do in him; 12 years' experience tells me that: I know what he has done.

509. Mr. *Newdegate.*] Was the substance of your report in favour of a Government establishment for manufacturing arms based upon your confidence in the estimates which Mr. Anderson has submitted, first to you, and then to the committee?—Those are approximate estimates.

510. Was the opinion in favour of the establishment of a Government small arms manufactory, which is embodied in that report, based upon the statement made to you of the practicability of such an undertaking by Mr. Anderson?—No; it was entirely the feeling of Colonel Chalmer and myself conjointly.

511. Where did you gather the information upon which you based the opinions you expressed in that report?—From various sources, and my own experience and Colonel Chalmer's experience.

512. You have never yet seen any such machinery, have you, at work?—I have seen Colonel Colt's and Dean & Adams.

 513. Then

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513. Then your opinion with respect to the practicability of the Government manufacturing all small arms for itself, is based entirely, so far as your opinion goes, upon what you have seen at Colonel Colt's factory?—Not entirely, but from my own long experience of what machinery is brought to, and what I have myself witnessed of its being applicable to the production of almost anything, including a musket.

514. Do you mean the application of machinery to the production of small arms, or other objects?—To the production of everything, small arms included.

515. In what respects have you seen the application of machinery to the production of small arms; to what parts of them?—To all the parts of a pistol in Colonel Colt's manufactory.

516. You never witnessed such an application of machinery anywhere but there?—Certainly not; except Dean & Adams, London.

517. You stated with respect to Birmingham, that the system of labour there was very anomalous, and that the people were working in wretched cellars and garrets, but you entered into no further detail as to the system of production in Birmingham, although you condemned it; may I ask you whether you are acquainted with the system of Government contracts which has been pursued since 1851 in Birmingham?—No, I do not know anything about that. I have heard that there have been great difficulties about contracts, but I do not think myself qualified to answer that.

518. *Chairman.*] Has Mr. Anderson made many machines for you?—Yes, during the time I was at Waltham Abbey as inspector of gunpowder, in charge of the mills there, he made a good deal, I should think amounting to about 10,000*l.*

519. Were many of them entirely new inventions by him?—Some of them were quite new.

520. Did he give in estimates for the cost of those machines?—Yes, a previous estimate was always made.

521. Did you find that those estimates were generally correct, or the contrary?—Generally very correct indeed. I do not know of a case of their being exceeded.

522. Mr. *Muntz.*] What were those machines applied to?—To granulating gunpowder.

523. Were they expensive machines?—Yes, very delicate machinery, requiring great delicacy in its parts, in consequence of friction being dangerous.

324. What would be the cost of such a machine?—I think about 2,000*l.*

525. It simply works in granulating gunpowder?—Yes.

526. It is light work, is it not?—It is not very heavy; it is principally composed of gun-metal.

527. It is not like working in iron?—No.

528. Mr. *Geach.*] Did you, before ordering this machine from Mr. Anderson, apply to Mr. Whitworth, and other machine makers in Manchester?—No.

529. You do not know what it would have cost if they had undertaken to make it?—No.

530. You state that Mr. Anderson gave in an estimate, and that he was always under the estimate?—No; I say that he was about it.

531. Did you examine into the accounts to see that he was so?—Yes.

532. Did you see that in all the instances he charged the proper amount for plant?—Yes, I did.

533. How did you arrive at that?—An estimate was made for the machine to be made in the arsenal at Woolwich, and the payment was charged to Waltham Abbey, and that was the money that was paid.

534. How did you ascertain the proper amount to be charged for plant upon that machinery; you stated that he gave an estimate, you found that he was about that estimate, and you stated that there was no charge for the plant?—No, I did not.

535. Was there a charge for the plant?—I am not at all aware of anything of the kind.

536. How could you say that it was within the estimate, when the estimate was without the plant?—I do not know what the Honourable Member means by "plant" in this case.

537. When you buy a machine, and give 2,000*l.* for it, that is plant; and

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when you work it, if you take the interest of money at 5 *l.* per cent., it costs 100 *l.* a year?—Quite so.

538. In making the machine at Woolwich, were you aware that anything was charged for plant?—It was delivered over to me to make gunpowder, and of course the interest of the money became a charge upon the gunpowder.

539. What was the charge for the machine itself that was made at Woolwich for plant?—I think about 2,000 *l.*

540. You do not know whether that cost included plant or not?—No.

541. Yet you say distinctly that you examined very critically into the estimate, to see that it did not cost more than Mr. Anderson stated?—I do not know of any case in which Mr. Anderson's exceeded the estimate in making a machine which he gave for it.

542. Mr. *Muntz.*] Supposing Mr. Anderson, instead of the machine being made at Woolwich, made it in his own manufactory, do you think that he would have no expenses to pay for his own factory; interest upon capital and superintendence?—I understand the question better now. It included all the expenses; I believe the 2,000 *l.* did include all the expenses.

543. Mr. *Geach.*] It included the plant?—I believe so; I would not positively say so, but I think that is the case.

544. You were very positive just before?—Because I did not understand the question rightly.

545. In making your calculation, did you not take into consideration the plant at all?—I did not understand what the honourable Member meant before.

546. Now that you do understand, will you state whether, in making your calculation, you took the plant into consideration?—I cannot say positively whether it was taken into consideration or not.

547. Colonel *Dunne.*] In the calculations which you have made as to the manufacture of gunpowder at Waltham, were not superintendence, the value of property, and the interest of capital, taken into consideration?—Yes, they were.

548. Mr. *Muntz.*] Is the same plan pursued at Woolwich?—I do not know.

549. You cannot say whether any portion of the general expenditure at Woolwich is laid upon the cost of an article?—I should say that it was. I think that the evidence given before the Finance Committee will tell whether Colonel Colquhoun, in giving in his estimate, included the plant or not.

550. Colonel *Boldero.*] With regard to that piece of machinery to which you have referred, has it been viewed by any of the private gunpowder merchants?—Yes.

551. Can you give the Committee any idea of what their impression was with regard to it?—They thought it a very beautiful piece of machinery. In 1843 we had a very great explosion, and it struck me that it would be a great thing if we could invent machinery in order to prevent the presence of the men; and with the aid of Mr. Anderson at that time, we were able to carry that out, and the machine has been working from that time till this with perfect safety, and without the necessity for any persons being present.

552. Mr. *Muntz.*] Is it a simple machine, or is it a complicated one?—Not complicated.

553. Can you describe it?—I think I could; 500 lbs. of gunpowder-pressed cake is placed in a hopper; and there is an endless band, with cross pieces of leather upon it, which comes out of the roller at the bottom of the hopper; and the pieces of cake, about an inch thick, get upon the shelves of the leather, which carries it up to a pair of gun-metal rollers.

554. Colonel *Dunne.*] The manufacture at Waltham Abbey being merely gunpowder, there is a facility, is there not, in reckoning what is called the plant, and apportioning it to the gunpowder; but where there are various machines of different kinds, as at Woolwich, is there not more difficulty in apportioning the exact amount of what is called plant to each machine?—I think there is.

555. Are you aware that in each of those cases there is an approximation made in apportioning the amount of plant to each article, though it cannot be given with strict accuracy?—Yes, I think that is the case.

556. Mr. *Geach.*] You have stated that several of the gunpowder-makers came to see that machine; do you recollect whether any of them have adopted it?—They have adopted a similar description of machine, both at Dartford and Hounslow and Feversham.

 557. They

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557. They do use machinery?—Yes, of a similar kind; but although it is of a similar description, and intended to produce the same end, they have not as yet adopted the same principle that is adopted at Waltham Abbey of the men being away from the machine when it is working. Now the men at Waltham are placed in a bomb-proof building during the time the operation is going on, and by a self-acting process of adjustment, a bell rings at this place, and gives notice that the whole 500 lbs. have passed through the machine into grain.

558. You found that it was necessary that this machine should be adopted for the safety of the men?—Yes.

559. And Mr. Anderson made a machine that answered the purpose?—Yes.

560. And other manufacturers have also adopted machinery to effect the same object?—Yes.

561. But you think that your arrangement is superior?—Yes; other manufacturers do not carry it to the same length of the men going out during the operation, but the same description of machinery is at work; the gun-metal rollers are working.

562. *Chairman.*] Are you acquainted with the various parts of a musket?—I do not pretend to know much about it. It was only in the month of January that this question was agitated in any kind of way, and I have been so employed since that time that I have not attended to it.

563. Mr. *Newdegate.*] You have just stated that you are not acquainted with the various parts of a musket, and yet you concurred in the report in which Colonel Chalmer and you represented that the cost of making a musket would be reduced to one-half by machinery?—Just so. I was sufficiently acquainted with machinery and its applicability to muskets to convince myself that there would be no difficulty in reducing the cost to very nearly one-half.

564. Although the manufacture of a musket is a process with which you are not very familiar?—I am not very familiar with the minute parts of a musket, but I know sufficiently, I think, for that, particularly after having seen Colonel Colt produce it; it was evidenced to my own eyes.

565. Mr. *Muntz.*] You have formed a rough estimate, based upon what you saw at Colonel Colt's factory?—Yes. I do not pretend to any decided estimate as to it, but it is merely as to machinery; and, as I stated before, I cannot express my opinion too strongly on that point.

566. Did Colonel Colt profess to make muskets as well as pistols?—I think so.

567. Can he make them with the same facility as pistols?—Yes.

568. Has he said so?—Yes.

569. And at the same relative cost?—Yes.

570. Are you aware how much cheaper Colonel Colt makes his revolvers than other people who do not work on his plan?—I do not know; but he keeps up his price in the market.

571. If he does not make pistols cheaper than other people, why should he make muskets cheaper?—I am certain that he does make his revolvers cheaper.

572. What is the difference in the cost between his revolvers and those of other manufacturers?—I think very great indeed. I should say something very great. I have seen Dean & Adams's, who are getting on in the right direction as to machinery; but not to the extent that Colonel Colt has done, nor anything like it. Colonel Colt has about 150 machines working in the most beautifully consecutive order that could be imagined.

573. I presume Colonel Colt will eventually monopolise the whole trade?—I do not say that. I hope that the very circumstance of this being agitated will cause a great number of manufacturers to employ machinery where it has not been done before.

574. Are you aware to what extent machinery is used now?—I do not believe that it is anything worth speaking about. I believe it is as much employed at Enfield Lock as anywhere else.

575. You are aware, are you not, that the barrel is altogether made by machinery?—Yes.

576. Then what other part is to be made by machinery?—The lock, and every part.

577. Do you propose to make the cock quite straight, as was stated by Mr. Anderson?—I do not think Mr. Anderson intends to make it quite straight; he

he will alter the curves of it, and that I think will be a very great advantage; so far as I know, I should say it would be an advantage. I do not wish to express a very decided opinion upon that. Lieut.-Col. *Tulloh*, R. A. 14 March 1854.

578. He stated, did he not, that it would be necessary to have the butt end of the musket, instead of its present form, hollowed out by a circular machine to the segment of a circle?—I never heard that.

579. Would that be a good improvement, do you think?—I cannot say.

580. Mr. *Geach.*] You have very candidly stated, that you knew very little about gun-making before you visited the manufacturing districts, and yet you reported that gun-making could be performed by machinery?—Yes.

581. Perhaps you know as much of wrought-iron nail making; did you ever see a nail made?—I do not know that I have.

582. Are you aware that all wrought-iron nails are made by hand now?—I am not; I think they had better be made by machinery a great deal.

583. Wrought-iron nails?—Yes, I should think so.

584. You have, I presume, the same ground for saying that, as for saying that guns could be made by machinery?—It is merely a matter of opinion.

585. Your opinion is as good with regard to wrought-iron nails as with regard to guns?—I do not know that I ever saw the nails made, but I know enough about making guns, to know how machinery could be made applicable to their production.

586. You never saw any guns made, did you?—Yes, I have lived in the vicinity of Enfield Lock for many years, and have seen them made there.

587. Is it from the knowledge you have obtained there that you speak now?—Yes, mainly.

588. Do you know that mechanical men have been engaged for many years endeavouring to make wrought-iron nails by machinery?—No, I do not know anythink about that.

589. Lord *Seymour.*] You stated that you had only been in the carriage department six months?—Yes that is all.

590. Then you have only had an opportunity for six months of becoming ultimately acquainted with the machinery of that department?—Only six months, but the machines there are such as I had been acquainted with before.

591. How long had you been acquainted with them before?—I had been through the carriage department very many times. I knew the nature of the machines, and I knew how they were used and their working.

592. You have not been a practical mechanic in any way?—No, except during the time that I was at Waltham Abbey; of course there I was continually placed in the position of a mechanic.

593. At the time you were at Waltham, you superintended the gunpowder establishment, did you not?—Yes, with all its machinery.

594. But that is machinery of a special kind, is it not?—Yes, it is; still it is machinery involving a good deal of the machinery of the day, and what I had seen in the arsenal, constantly going over to Woolwich to see that machinery, gave me a certain knowledge of machinery.

595. A certain general notion?—Yes.

596. It would not be from that general notion of machinery obtained at Waltham, you would undertake to say that machinery could be applied to the manufacture of muskets?—Not that alone, but as well what I had seen during my tour into the north, and experience.

597. What you were very much struck with in the carriage department was the great advantage of machinery in reducing wages?—Yes.

598. The machinery was introduced in 1846-7, I think, into the royal carriage department?—I only stated that time to the best of my recollection.

599. I find that the charge for wages in the year 1845-46, in the Royal carriage department, was 16,000 *l.*, and upon the introduction of machinery it rose to 24,000 *l.* in the next year. In 1847-48 it rose to 33,000 *l.*, and in the last year to 39,000 *l.*, and in the present year the estimate is 47,000 *l.* Therefore, so far as the Committee may judge of the effect of machinery in reducing wages, it appears that, so far from that, it has increased wages largely?—But suppose you had not that machinery, you would have to place a very large sum to each of those sums that you have enumerated; about one-third more you would then have to be added.

600. Do you believe that in any former time since Woolwich has existed so much

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much money has been spent in the carriage department as has been spent in the last two years?—I cannot answer that question; I think it has been very large; but it is most fortunate that such has been the expenditure.

601. In former years I find that 10,000 *l.*, 5,000 *l.*, 6,000 *l.*, and 7,000 *l.* was the expenditure for wages in the Royal carriage department; but since the introduction of machinery which was to reduce the wages, it appears that the wages have risen not only to double the amount but more than four-fold?—Yes: but not on account of the machinery.

602. It does not appear that the machinery has had the happy effect of reducing the cost?—There is not the slightest doubt that it has. You must add a large sum to the sums which have been mentioned, which are quite correct. As I have stated, the machinery is doing the work of 400 men at least now.

603. Mr. *Monsell.*] Has there been a large increase in the number of articles produced in the Royal carriage department?—An immense increase.

604. Colonel *Dunne.*] During several years there was very little done in the arsenal, in the carriage department?—Yes.

605. Was it not the fact that our artillery was in a most inefficient state in consequence?—Yes.

606. And the reason why this additional work was done in the carriage department was on account of the neglect that had occurred for several years?—Yes; and Lord Hardinge, when Master-general of the Ordnance, gave an order that 50 batteries should be immediately made.

607. Lord *Seymour.*] In the questions I put to you I did not take the articles manufactured, nor the total expenditure in the carriage department, but I took a particular item which you have stated had been so greatly reduced by the introduction of machinery, namely, the wages of labour, and it appears that they have increased nearly five-fold since the introduction of machinery?—Yes.

608. Does not it appear, then, that the wages of labour have not been materially reduced by the introduction of machinery?—No; it does not appear so at all.

609. You were sent into the manufacturing districts on the 24th of January 1854, were you not?—Yes.

610. You stated that you were directed at that time to consider the means of obtaining machinery for the manufacture of small arms?—When we started, there was a large alteration to be made in the laboratory department of the Ordnance, which was in a very crippled state, and a committee was formed for the purpose of obtaining information, and finding out how far machinery could be applied, and also for making a building for the machinery to be placed in relation to laboratory purposes. When we had been on the tour for some time, the small arms question came to the same committee to consider.

611. There was to be a new building for laboratory purposes?—Yes, and new machinery.

612. Did you recommend this new building, and this new machinery, or was that settled before?—That had been settled before.

613. When you were on your progress, you received directions to inquire respecting the manufacture of small arms?—Yes; as I stated before, we received instructions from the Master-general and the Board.

614. You stated that you were very much hurried in your inspection of the machinery in the different towns you visited?—We regretted very much that we had not more time; but there were certain circumstances which required the presence of the heads of departments in their places at that time; but we were anxious to get every information that we could bearing upon the point.

615. You could have made a more complete report if you had had more time?—Yes, and it is I believe the intention of the Board that we should be sent a second time to get information.

616. You have stated from what you saw there, and in London, that you were satisfied that the price of a musket could be reduced from 3*l.* to 1*l.* 15*s.* 8*d.*?—Yes.

617. Upon what data did you come to that conclusion?—The only data I have to give is the evidence of Colonel Colt's manufactory, by which it is self-evident; so much machinery being introduced there, and so little hand labour being required, I could come to no other conclusion.

618. Which conclusion you came to from going through Colonel Colt's manufactory,

manufactory, and seeing the wonders that he performed in making pistols by machinery?—That is one of the most prominent points in my evidence.

619. In the report you recommended that machinery should be adopted?—Yes, and I am firmly of that conviction.

620. You did not enter into the question whether the machinery should be erected at Enfield or at Woolwich?—Yes, that was entered into.

621. Which did you recommend?—For a long time I recommended Enfield, because there was water power there, and the establishment was there, and a certain number of buildings, and I imagined it could be placed there with advantage.

622. Have you given up that opinion, or would you still recommend Enfield rather than Woolwich?—The reason why I did not adhere to Enfield was the difficulty that presented itself in not being able to get any population in that part to supply a sufficient amount of labour.

623. Colonel *Boldero.*] Is there water-power unemployed to a large extent at Enfield?—Not very large.

624. Colonel *Dunne.*] Would it be sufficient for the purpose?—Not anything like it.

625. Colonel *Boldero.*] In calculating the price of a musket at 1*l.* 15*s.*, what do you allow for wear and tear?—I have not made any calculations.

626. Do you know how long a musket is supposed to serve a soldier?—No, I do not.

627. Will you venture to give it as your opinion that a musket that is made exclusively by machinery, when it is exposed to the hard usage and knocking about to which it will be liable in the hands of our soldiers in the East, will stand wear and tear in the same way as an ordinary musket?—In my opinion it will stand it better.

628. Mr. *Geach.*] How came you to arrive at the sum of 1*l.* 15*s.*?—I never mentioned that sum.

629. What sum did you mention?—I never mentioned any sum; I said one-half, and I am quite ready to say so.

630. Why do you put it at 35*s.*?—I say about one-half, and I arrive at that from my knowledge and experience in machinery, and from having seen the production of Colonel Colt's pistols by so many machines, doing away with hand labour.

631. Mr. *Muntz.*] Do you mean the present rifle or the musket?—Any musket or rifle, whatever it may be.

632. Mr. *Geach.*] What does Colonel Colt sell his pistols for?—I think somewhere about 6*l.* or 7*l.*

633. What is the comparative cost of a pistol and a gun, speaking roughly?—I should say by machinery, as Colonel Colt makes it, the difference is very small, but I could not say.

634. Lord *Seymour.*] You stated before, that one great reason in favour of a Government establishment was that the demand for those arms varied very much?—Yes.

635. And you even said, that sometimes there is no demand for muskets?—I should say no contracts out for muskets, and no demand on the part of the Ordnance.

636. That is to say, the Ordnance do not want them?—Whether they do or not, there is no demand.

637. What did you mean when you said, "There is often no demand for muskets"?—No demand upon the trade of Birmingham, and no contracts out.

638. Do you suppose that the supply of arms in this country can be kept up without a regular annual supply to make up for those that are worn out?—There ought to be a continual contract, or some means of supplying them continually.

639. Then there ought to be a regular supply every year, to supply deficiencies in the arms, ought there not?—Yes; I should say certainly that the British army ought to have some means of being supplied according to the number required.

640. Have you considered what quantity will be required annually?—No, it is not my province.

641. In going into the question of labour, that is a material question, is it not?—That

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—That is a consideration with the Board, as to the number we should require; but I have made no calculations.

642. Is it not material, in recommending machinery, that you should consider how many guns are to be produced annually?—Yes; that would be according to the emergency; we have said, if you make a musket by machinery, having machinery to make a maximum quantity, you can make any number below that.

643. You would create so large an establishment, that you could make the largest possible quantity that was required?—Yes, the very largest quantity, within a reasonable rate, that would be required for the service.

644. What is a reasonable quantity?—We said about 500 muskets a-day in case of necessity.

645. Mr. *Walpole.*] In the report made by you, recommending machinery, was any detail or general reference made as to the saving which would be effected by the introduction of machinery?—Nothing more than what I have read.

646. Has any estimate been made either to you, or by you, of the cost of the machinery, the cost of labour, the amount of labour employed, the result to be derived from these and other items, as to the cost which you now state to the Committee each musket would be reduced to?—Nothing more than what has been drawn out by Mr. Anderson; I have made no computation.

647. You are not aware whether any such estimate has been furnished?—No; nothing more than an approximate estimate.

648. Mr. *Muntz.*] You stated just now, did you not, that you were satisfied that a musket made by machinery, would wear a great deal longer than a musket made by hand labour?—No; I stated that it would be better.

649. Which part of the gun is it that will be so improved?—My opinion is, that when there has been so much accuracy in all its parts it will be like one of my wheels; it will be a great deal better and stronger than one made by hand labour.

650. The barrel is now made by machinery, is it not?—Yes.

651. Of course then it must be some other part of the gun that will be better than the present gun; which is that part?—The whole of the parts of the musket, including the stock, and the parts where the cock and every part fits into the lock I think will be so made by machinery, so identical in its parts, that when the whole is put together they will fit closer and better.

652. Are the parts of the gun not now required to fit so closely that there is no imperfection in them?—They are very much so; I think there is now a very beautiful musket.

653. Then where is the great improvement to take place?—I do not think that when the two are finished there will be any great difference, but I think it will be in favour of machinery, because the parts are made more identical.

654. Do you mean to say the gun will be entirely made by machinery?—No, there will of course be a very great portion made by machinery, and some by hand labour, of course.

655. The hand labour is, in fact, to be in the nicest part of the work, is it not, the putting it together?—No.

656. Do not you think that the putting the parts together will require hand labour?—Yes.

657. Requiring to be done with nicety and care?—Yes; but the parts will be made so nice before, that it will not require so much, I think.

658. Colonel *Dunne.*] It has been stated that machinery will make the different parts of a lock so accurately that they can be taken out in the field in case of any breakage, and a new piece substituted for the broken one; do you think that that can be effected?—I have understood that it can be done.

659. It has been stated that in the American war in Mexico such a thing was done; do you think that it can be done in such a way as that a piece can be put in without filing?—I will not pretend to say that.

660. Colonel *Boldero.*] Glasses for watches are turned by machinery, are they not?—Yes.

661. If you break your watchglass you go to your watchmaker for a new one, and he will go to No. 5, which corresponds with that in your watch, and try 20 or 30 before he gets one to fit, though they are all made to the same number, No. 5?—Yes, they are; but I fancy they are not made with that degree of nicety, and not turned out by machinery in the same way.

Captain Sir *Thomas Hastings*, R. N., C. B., called in; and further Examined.

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662. Mr. *Monsell.*] IS there any answer that you made, on the last occasion, to a question put by the Honourable Member for Warwickshire, that you wish now to correct?—Yes; it is a mere correction of the date. I stated that Mr. Francis Lovell had been discharged from the department before the period at which the 1851 muskets were set up. I believe that he was discharged about two months after that time, and not before, and I came to that knowledge by referring to a letter from the setters-up, in which they ask that a superintendent may be sent down to Birmingham; and on reading over their letter, I perceived of course, as they asked for a superintendent, and Mr. Francis Lovell was sent down there subsequently, that he could not have been discharged before.

663. Mr. *Newdegate.*] I think you misunderstood my question, which was this: whether Mr. Francis Lovell was not dismissed from the service after the period when the Honourable Member for Birmingham and the Honourable Member for North Warwickshire had the honour of waiting upon the Master-general of the Ordnance, with a deputation, on the subject of the view?—I believe that my answer was incorrect. I think he was dismissed afterwards; but explicitly I repeat that it was for no question of his conduct at Birmingham, or in reference to his profession, but for another cause totally irrespective of his duties of viewing arms.

664. Having corrected your answer, the reply which you wish to give is this: that after having heard the representations made by the trade, and the representatives of Birmingham, the Master-general of the Ordnance set them all aside; and so far as his conduct could express an opinion, he approved of the proceedings of Mr. Francis Lovell in respect of the view?—No, I do not mean to say that. I mean to state that Mr. Francis Lovell was dismissed afterwards, and that he was not dismissed on account of any complaint made about the viewing of the barrels or any part of the locks at Birmingham; but he was dismissed for conduct which happened in the Tower before being sent to Birmingham, and not having any reference to the viewing of arms.

665. Are the Committee to understand you to say, that if there had not been other misconduct on the part of Mr. Francis Lovell, he would not have been removed on account of what had been shown to have been his conduct in the view?—Decidedly, and I think Lord Hardinge expressly stated that, at the close of the case.

666. *Chairman.*] Has the Board of Ordnance received a letter from Colonel Colt?—It has.

667. Will you read it?—Yes; this is an extract from a letter from Colonel Colt to the Master-general and Board, dated the 13th of March 1854. "So confident am I, that this system of manufacturing fire-arms is correct, and the only one by which arms can be made the one like the other, with economy, that I am free to say, what I have before verbally stated, that with 100,000 *l.* expended in machinery, tools, &c., one million of rifled muskets can be produced at an expense of 30*s.* each, and that while they will possess the advantage of uniformity of parts, none that are thus made will be inferior to the best that can now be found in Her Majesty's service, for military purposes. I do not want to make a proposition or a contract for the construction of a million of arms that are not of my own peculiar principle, while you have men of ability who, I believe, are fully competent to produce the results I name; yet I am equally free to say that I can and will produce the one million of arms, if you desire me to do so, at the prices above named (30*s.*), and I would endeavour to do all the work in this country unless I might be interrupted by combinations of operatives, claiming from me more than the present price of manual labour. To conclude this much longer letter than I intended to write, I must state that in estimating the fabrication of so large a number of arms as one million at these apparently cheap rates, I have subdivided the tools and general expense account among the whole number, and most of which general expense would be absorbed in making the first one or two hundred thousand; so that if the Government should not determine to establish a national manufactory for making arms upon a large scale, any private manufacturer who furnished his own capital, tools, machinery, &c., competent to make good work, should be paid for the first 100,000, I should think, 1 *l.* more on each arm made, which would make the cost 50 *s.* each instead of 30*s.*, estimated for the greater

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greater quantity. Finally, gentlemen, I would even guarantee to make the smaller named quantity, say one or two hundred thousand, at this last-named price, 50*s.* each, and with the greatest possible dispatch, employing all the machinery I have here now, that coming over from America, and can make or procure, that is applicable to this particular business of making small fire-arms. (signed) *Samuel Colt.*"

668. Lord *Seymour.*] It seems from that letter that Colonel Colt actually offers to contract for the supply of arms?—Clearly; and he has told me so verbally also.

669. Then there is no necessity for a Government establishment if we can find an individual to undertake to supply the arms required?—Certainly, if the Government are inclined to make Colonel Colt a present of the profit which might go into the pockets of the public.

670. Do you think that Colonel Colt would make too good a bargain?—I think he would make a good bargain for himself.

671. *Chairman.*] He would produce a million muskets for 30*s.* each?—Yes. I am happy, speaking of Colonel Colt, to state that when the Baltic fleet was preparing, the Admiral commanding that fleet applied especially to have a proportion of Colonel Colt's revolving pistols; that is about eight or ten days ago, and the Admiralty sent a requisition to the Board of Ordnance to furnish those pistols. I had an interview with Colonel Colt, and explained to him what was wanted, and I told him that unless the arms could be furnished rapidly it would be of no avail. He then said, "I have many demands on hand, but I will take this order, and I will furnish the 4,000 pistols that you want within a month, and you shall have on Wednesday," that is, to-day, "the first 50 delivered at the Ordnance Office." This morning a box arrived complete, with a very perfect assortment of arms and appurtenances, and accompanied by a letter in which he states that in the course of a fortnight we shall have 1,500 more, so that when the next division of the fleet proceeds to the Baltic, those pistols which are so much wanted may be sent in the ships that are going to join Sir Charles Napier; and in that letter he also states, that if any further supplies are required they shall be furnished with equal rapidity. The price is certainly very moderate.

Date of Admiralty requisition, 6 March 1854.

672. Lord *Seymour.*] He offered, did he not, to furnish the muskets at 50*s.* each, if you took a limited quantity of 200,000, and if you took 1,000,000, at 30*s.* each?—Yes.

673. Therefore you would at once make a great gain by accepting Colonel Colt's offer, according to the prices that you have been paying for muskets?—Yes, certainly; but I would add, that if you extend the question through its whole bearing, you would sustain a great loss, because in the answer which I gave to that question I showed that the saving upon 900,000 stand of arms would be rather more than 1,000,000 *l.*

674. Colonel Colt offers to make the musket for 30*s.*, as I understand?—Yes, and I have no doubt the Government factory would make it at the same price; only to prevent any exception being taken, I have put it forward at 2 *l.*, to prevent an objection being taken that I had put it absurdly low.

675. When Colonel Colt makes that offer, he has of course seen the rifled musket which you wish to have produced?—Yes, I sent him one of those made by hand labour. I have never seen a musket more perfect, and there is nobody more ready to bear testimony to the dexterity and skill of the Birmingham workmen than I am.

676. Did you tell him what a strict system of view you had?—No, I did not; but he has admitted that the arm supplied should be subjected to any test that the Government chose.

677. Then there is an opportunity now, if the Government were to accept Colonel Colt's offer, of making a very great saving, and, as you say, of procuring the muskets in a very short time, because he has his machinery ready?—No, his machinery for making revolving pistols, and his tools, I conclude, are very different from those which would be used; sufficiently different to make it necessary to have new ones to make muskets.

678. For the locks, would the machinery be very different?—Yes, it would be a different size.

679. The Committee were told by Mr. Anderson that the new building at Woolwich would cost a very large sum for the foundations; the foundations are

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very bad, are they not?—They are not good; but with regard to the site on which it is proposed to fix the factory, General Harding, who is Assistant Inspector-general of Fortifications, who has had much experience, and was employed at Woolwich as a young man when the buildings there were being constructed, told Lord Raglan in my hearing, that he had no doubt of the foundation being sufficiently good to support the sort of building necessary for a factory, which would not be in its superstructure a heavy building.

680. Would it not be a heavy building containing those steam engines?—No, they would not rest on the floors, but each on its own foundation on the ground.

681. Have you not a storehouse at Woolwich that is very much inconvenienced by the foundations?—Yes, but that is lower down, and nearer to the river.

682. You were obliged to take the heavy stores out of it, were you not?—No, we were obliged to put them in. Sir William Reid, when engineer at Woolwich, saw that those storehouses were little used; he paid considerable attention to the matter, and made various marks, and he came to the conclusion that weights would rather have a tendency to prevent than accelerate the fall, if placed as he suggested, which has been done, and I think the progress of destruction is certainly slower than before.

683. Still the ground on which you are going to build is not good ground?—No.

684. Did you ask Colonel Colt in what time he could set up machinery for making the muskets?—No, I did not; but I take it that a factory might be put up in 12 or 15 months, and be at work.

685. The Committee were told by Mr. Anderson that at first this work must be expected to be irregular and inaccurate; and that in any machinery it would take a long time and attention before you could bring it to that nicety that was required?—He stated to me something like that which your Lordship has said, but not quite so decidedly. He said that in all machinery there were little breaks in the beginning; but he told me that he had no doubt we should get 100,000 stand of arms, supposing the factory to be built on the scale proposed, in the first year.

686. Mr. *Muntz*.] Within the year?—Yes; supposing it to be built on the scale proposed, that is, to produce 150,000 stand in a year, we should get 100,000 the first year of beginning to work after the works had been completed.

687. Mr. *Newdegate*.] Your opinion was very strong, was it not, till within about two months, in favour of encouraging the trade at Birmingham, and relying upon them for the supply of arms, in conjunction with the trade of London, as the Government of this country have done hitherto?—Yes; I admit that.

688. May I ask whether there were no national considerations which had influenced previous Governments, in encouraging the arms trade of this country, besides the mere cost of the arms themselves?—I will endeavour to reply by first of all stating that my conversion to the opinion of its being wise to have a Government factory is not, as I have before stated, of long standing. And perhaps I shall answer the question that the Honourable Member has put to me better, by stating the reasons of my change of opinion. The paper which I hold in my hand will show the state of the outstanding orders for the last year. I think the oldest order goes back about a twelvemonth, and that shows that our supplies are limited, and that during the last year, that is, for the last five months, from October to the present time, we have only been able to get about 4,000 barrels from the barrel rollers. (*A paper was handed in.*) Now, it is that want of supply mainly that has led me gradually to change my opinion. I see that the gentlemen who are engaged in this trade told me that they would prepare those materials without delay, and that they have not done so. Then I look to see why they have not, and I infer that they have not the means of doing it, because it certainly is their interest to furnish them; or if they had the means of doing it, then they have other and more remunerative employment, which prevents the Government from depending upon them; and placed in my situation, I confess I have had, during the last 18 months, very many anxious moments about the deficit in the store of small arms for the defence of the country. These things have weighed on my mind, and thinking that there were, as the Honourable Member has stated, certain national reasons why we should not cast aside the gunmakers, I have felt pressed by the conviction that we cannot get enough skilled workmen

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workmen to produce such an arm as that we now want, at the rate of 25,000 a year; this has led me to the conclusion that it is a duty to the country, on the part of the Master-general and the Board of Ordnance, to put forward this proposition. I have no sort of complaint against the gunmakers and the gentlemen employed in that trade. I think, as I said before, that their arm is a good one, and the only thing that I point to is the system of quarrelling between the masters and the men, which makes it very uncertain as to getting supplies from them; and perhaps, in reference to that, I may be permitted to read this paper, which shows in some measure the manner in which the trade is interrupted by combinations and strikes, and so forth.

689. Lord *Seymour*.] What is this paper?—Showing the system of combinations and strikes. "At a special meeting of the operative gunmakers, held at Mrs. Gray's, the Fox and Dogs, Princep-street, Birmingham, on Thursday the 15th April 185 "—the date is left out; I believe it was in 1853—"It was unanimously resolved, That in consequence of the large increase of workmen which has taken place during the last few years, which increase has raised the amount of labour considerably above the demand, we deem it prudent to adopt some regulations to counteract the growing evil of admitting fresh hands into the trade without some restrictions; we therefore mutually agree that no stocker, screwer-together, or finisher shall employ more than one assistant, which assistant shall be apprenticed or articled until they are 21 years old, only such to be apprenticed or articled as are already in the trade. All agreements to be submitted to the inspection of the committee, and subjected to their approval; errand boys under 14 years of age, and screwers-together receiving full prices for their work, not to be considered assistants. Parties in the trade above 21 years of age, who have been in the trade for a term of three years, to be articled for a term not less than two years. The co-operation of every workman in carrying out the above resolutions is earnestly requested by yours, respectfully, The Committee."

690. Mr. *Newdegate*.] Do you know how many persons attended that meeting?—No, I do not.

691. This was a meeting supposed to have been held at Birmingham, and you do not know how many persons attended it; you do not know how far the combination extended into the trade, or whether this is not a mere newspaper paragraph, put in by some persons wishing to start such a movement?—I will not venture to say that that is not exactly the case; but if I am permitted, I will bring the next time I come before the Committee a paper bearing upon this question, which will enable me to show that the system of combination is perfectly organised, and that the object is to control the trade; sometimes the masters do it, and at other times the men do it. Here is a paper signed by the secretaries, dated "Birmingham, January 16th, 1852. Sir,—We, the operative gunmakers employed in Birmingham and London, in setting up small arms for the Honourable Board of Ordnance, beg to refer you to the undermentioned resolution, unanimously agreed to after a careful examination of the pattern gun. That the price of stocking and finishing the new rifle musket be as follows:—Stocking, 3 *s.* 9 *d.*; finishing, 12 *s.* 3 *d.* The contractor to find a competent person to put on the sight, and pay the expense of doing the same. Waste work to be paid for as follows:—That all stocks made waste for faulty timber to be paid half price for in the different stages, viz., stocking, screwing, and finishing. That 3 *s.* be paid for fitting in all barrels made waste from causes over which the finishers have no control. We also beg to state, that should you not be successful in obtaining a contract, we pledge ourselves not to work for any one under that price, be the term of his contract what it may. By order of the committee, *J. Frost*, Secretary *pro tem.*, Birmingham; *E. Lowndes*, Secretary, London. Committee-rooms, Fox and Dogs, Princep-street, Birmingham; White Hart, Leman-street, London. The estimate for finishing includes many other items, as made by men in London, but is the same on the whole." Then, "London, January 20th, 1852. Sir,—We most respectfully beg to lay before you, for the purpose of showing the exact position of the affairs of the trade in Birmingham, the enclosed list of prices which has been submitted to the contractors in Birmingham, whereby they make their estimates for setting up the new rifle gun. The said list, we beg respectfully to state, does not in any way affect the list submitted to your notice on Friday the 16th instant, by the deputation appointed for that purpose, which reads as follows:—Stocking, 3 *s.* 9 *d.*; screwing, 6 *s.*; finishing, 3 *s.* 8 *d.* We respectfully

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fully beg to apologise for a second list of prices so irregular and unbusiness-like in appearance, and assure you it was nothing but the desire to meet our employers upon the question of prices which led us into the error, which we trust will be sufficient to excuse us. Hoping the same will meet your approbation, I remain, yours obediently (by order of the committee), *E. Lowndes*, Secretary, White Hart, Leman-street."

692. I ask whether the setters-up of the new pattern rifle who are engaged to complete those guns have ever represented to you that this combination prevents their completing their contracts, or is it the fact that they have ever been supplied with the materials?—I think I can read a paper from those gentlemen that will bear exactly upon that, dated the 22d of March 1852:—"Memorandum of an interview between the clerk of the Ordnance and the principal storekeeper and the contractors for setting up the new rifle muskets, viz., Mr. Sheath, on the part of Messrs. Hollis and Sheath; Mr. Lawden, on the part of Tipping & Lawden; Mr. Swinburn, junior, on the part of Swinburn & Son; Mr. Turner; all of Birmingham. The contractors represented that the men had refused to work for the prices which they had, through their chairman and secretary, agreed to take, when they (the contractors) made their engagements with the Board, and requested that they might not be pressed to proceed with their contracts. (This was acceded to.) The above contractors further offered to set up 5,000 rifle muskets which had been undertaken by Mr. Holland of London, provided the Board consented to an application which has been made by Mr. Holland to be relieved from his contract in consequence of the London workmen having struck for an advance upon the prices at which they undertook to do the work, amounting to 16 per cent. (The Board cancelled the contract with Mr. Holland, and accepted the offer of the Birmingham contractors, which acceptance is not to be promulgated at present, as requested.) Should the above proposal be accepted, the contractors requested that their offer, and the Board's acceptance of it, might not be promulgated at present. The contractors proposed (for the purpose of facilitating an arrangement with the men in regard to certain parts of the work), that the muskets should be viewed with the barrels in the bright state, and that there should be a final finishing view, after the barrels had been browned, rifled, and sighted. That the barrels should be taken out of the stocks for those operations, and that the stocks should in the mean time be kept in the Ordnance View Rooms. (The contractors withdrew this proposal in consequence of the difficulties which were pointed out to them, and in which they acquiesced). The contractors solicited the appointment of some person superior to the viewers to superintend the Ordnance business at Birmingham. (The Board made no promise to comply with this request, but stated the subject would be considered.)" That was considered, and the assistant inspector of small arms was sent down at their request.

693. What was the result of that communication so far as the contract was concerned; was it persevered in, or was it withdrawn?—It was persevered in.

694. Was it voided in consequence of that letter?—No, not at all. It says here, They propose that the 5,000 muskets should be divided amongst them in the proportion stated, and that was done.

695. The result of that communication was, that they proceeded with the contract?—"The contractors requested that their offer and the Board's acceptance of it might not be promulgated at present," and also at that time, or about that time, as I can show from another paper, speaking from recollection, they requested, in consequence of the differences between themselves and their men, that we should not press them to send in the muskets immediately; and as it appeared to the Board that they were hardly and unfairly pressed, we waited for a time to allow them to look round them, and see what could be done.

696. Then the whole of those negotiations resolved themselves into a question of time?—They made their engagement with the Board, and requested that they might not be pressed with their contracts.

697. That was acceded to, and therefore the only change was a change as to time?—There was another change, that they should take Holland's contract, and that they should be permitted to stand fast a little time to arrange the disputes with their workmen. They also asked that certain parts of the work should be differently viewed from the customary course, which they subsequently admitted not be done.

698. You

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698. You adduced that document, did you not, to show that combinations prevented the completion of the contract?—I produced it to show that disputes existed between the masters and the workmen, and that combinations existed. I also produced it to show that this particular contract of 1851 was delayed in consequence of this dissension between the setters-up and their workmen.

699. That was a contract for the Minié rifles, was it not?—Yes.

700. Which were crooked-sighted in the progress of construction?—Yes. On this point, when they asked for delay, which, I think, was for about six weeks, no muskets had been delivered, and therefore no muskets had been sighted, and consequently the crooked-sighting of the muskets could have no bearing on the question at this time.

701. Then that was a question of six weeks?—Yes; as I was asked whether any application was made from the setters-up, I will read another letter from the setters-up: "Birmingham, 22 March 1852. Sir,—It is with much regret that we have to inform you that we are at present unable to proceed with the setting up of the new rifled muskets, in consequence of our workmen now refusing to work at the prices agreed upon between us previously to our settling the price with the Honourable Board. We desire to state, we are willing to pay the prices fixed in their list of the 10th January last, and which are the same as paid to them in 1849, for the new line musket, and which they on several subsequent occasions have declared to be fair and reasonable; we feel quite convinced, that if we were to comply with their present demands, we should impede rather than facilitate the supply of arms. We have reason to believe that the workmen have an impression on their minds, that unless they obtain the advanced prices they will not be able to get their work passed in the view rooms without difficulty; we would beg respectfully to suggest that if a resident officer could be appointed in Birmingham competent to decide any dispute between contractors or viewers, and workmen and viewers, such officer would be a great benefit to the public service, and would in all probability have prevented the present unhappy dispute between ourselves and workmen. We beg to state our decided opinion that the workmen would have been satisfied with the arrangements entered into between us previously to our settling the prices with the Honourable Board, had it not been for the influence exercised over them by other parties; and we know that the gunmakers (whose tenders for the setting up these arms were not accepted by the Honourable Board, and who are aware that we are limited to time in the execution of their contracts) have used every means in their power to induce the workmen to hold out against us, and have signed a document for the workmen within the last few days," that is, the contractors who were not accepted, "stating that their demands were fair and equitable, although the workmen have admitted the prices we offer for the labour we require from them to be fair and reasonable. We now most respectfully have to ask that the Honourable Board will allow the prices paid to the workmen at Enfield, stocking, screwing, and finishing the new rifled musket, to be posted in the view rooms, as we believe it would be a benefit to the public service. We beg most respectfully to request that the Honourable Board will be pleased to extend the time for setting up these muskets beyond the time named in our contracts. We have the honour to be, Sir, your most obedient servants, *Hollis & Sheath, Chas. P. Swinburn, Jun., Tipping & Lawden, Thomas Turner.*" Now, I must say that these gentlemen, in all the dealings that I have had with them, have been extremely straightforward; and the desire of the Board, where it could be done justly (disclaiming any right of interfering between the masters and the men), was to do that which was just between both whenever they could.

702. Mr. *Newdegate.*] These gentlemen have repeatedly complained of the system of view, have they not?—Several complaints have been made, and two of them have been heard; and after they had been heard, Lord Hardinge, then Master-general of the Ordnance, declared that he could not conscientiously say that the view was too severe.

703. What is your own opinion as to the present system of contracting with, I think, from six to nine different parts of each musket, each separate contractor being subjected to view. What is your opinion of that system, as compared with the simple system, under which one contractor should be responsible for the delivery of a complete arm?—I do not think that that would be good; I will not give my own opinion in this case, but the opinion of a person well known

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known in the trade and very much respected, namely Colonel Bonner, who is at the head of the large establishment for military stores of the East India Company. The last time I visited him, not three months ago, I was desirous to know his opinion on this very point, and said, "What is your opinion? It has been proposed to us to take the muskets altogether set up, and that has once been attempted at the Ordnance and it failed." He said, "I am persuaded that it is a system that cannot answer; I should never counsel the East India Company to adopt such a system." It appears to me if the view is properly and fairly conducted on just principles, and the superintending officer is sufficiently in the rooms, it must be fairer to the men and better for the purchaser; and when it is considered that a man risks the whole of the musket if it is condemned for a part, it does appear to me that it is not a system likely to do so well as that system which takes the materials, one by one, and has them inspected and marked, and pays for them every week. It appears to me that when you can go into the market, as the Government does, paying ready-money for the material, you must get it as good, and as cheap, if not something cheaper, than the individual manufacturers.

704. In short, you prefer dividing the responsibility and employing a larger number of contractors?—Yes, I agree with Colonel Bonner.

705. What is the system under which the East India Company procure their arms; is it identical with that pursued by the Ordnance, or is it different?—I believe it is identical; so I understood from Colonel Bonner.

706. You only speak from what you have heard?—I speak from my own observation also. I entertain the opinion which I have given, and I give the Committee the opinion of Colonel Bonner, who has had still greater experience than I have had.

707. Then are the Committee to understand from you that the system of procuring arms by contract adopted by the East India Company is identical with that of the Ordnance?—I believe so.

708. As you have stated there were only seven barrel contractors, will you state whether, if the whole of the arm were contracted for by the same parties, it would not be possible that those parties should either roll for themselves or employ some others besides these seven firms?—I have spoken on this point to some of the gentlemen engaged in the material trade, and some of them have told me that they should prefer the present system.

709. Has that been the invariable answer?—No, I do not say that it has; I have not asked a great many, but some very respectable gentlemen have told me frankly their opinion on that point; and it appears to me tolerably clear that if gentlemen living in the same town, and dealing in certain articles, were inclined to deal, they would prefer dealing with the Government, who would pay them on delivery and acceptance, rather than with their fellow townsmen.

710. Is it not possible that, by the process referred to, the arm might be procured cheaper than you get it for at present?—I think not; I cannot see upon what principle. It appears to me that where the Government actually pay ready money, which enables the manufacturer to turn his capital over oftener, you will get the material at a better rate than if you go to a second man with a middle man between you.

711. At all events, you have not known the system adopted of contracting with one party for the finished arm, but subject to the view of the parts before the musket is set up?—The only instance I know of is, that some years ago that system was attempted, and some of the gentlemen in the gun trade in London considered it hazardous, and it was given up. That was before I went to the Ordnance, and it is not within my personal experience. I have another paper which I wish to read, showing the bearing of those combinations and strikes.

712. Lord *Seymour*.] What is that paper?—It is a memorandum taken by the secretary, Mr. Wood, in the presence of the then clerk of the Ordnance and myself.

713. Relating to another arrangement between the masters and the men?—They came to make a complaint, and this is a memorandum of what passed in our presence, taken by the direction of the Board, whilst the conference was going on.

714. *Chairman*.] What is the date of that?—The 22d of March 1852.

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715. Lord *Seymour*.] You have been complaining very much of the differences existing between the masters and workmen, and referred to a meeting of the workmen, to settle prices. Did not the Ordnance set a very bad example in that case; did not Mr. Lovell go down and give them such and such prices? —Yes, but that was not done by the Board; and immediately that the Committee of the House of Commons expressed their opinion that it was not well that such a course should be pursued, we put an end to it; and though we have got arms cheaper since, we have not been at all so peaceful as we were before.

716. If you object to the system of an arrangement for settling prices, was not the Ordnance to blame for having set the example?—I think the Ordnance of that day should not have sanctioned Mr. Lovell's proceeding; but the moment the Committee of the House of Commons said that it was a bad system, it was given up.

717. Mr. *Geach*.] With regard to those gentlemen you speak of so highly, as having performed their engagements, can you give their names?—I speak of them highly; but they did not perform their engagements either in 1851 or 1853.

718. You spoke of them in favourable terms; have not those gentlemen told you that if they had an order for arms out and out, they could supply you with a much larger quantity, and undertake to do so within the time specified?—I admit that they did make such an offer, and it was considered, but not accepted, for the reasons which I have endeavoured to explain to the Honourable Member for Warwickshire.

719. Do you happen to know, that when a large order comes into Birmingham, as it often does, for a quantity of arms, through some merchant who lives on the spot, and has the same means of communicating with the manufacturers as you have at the Ordnance, any instance has occurred of their buying the separate parts, in the way that the Ordnance do?—No; and I believe, if you took those arms to pieces, you would find them of a very inferior character.

720. Are not the merchants as interested as the Government in getting as good a quality, and at as low a price as possible?—No; I think not. I think they are interested in getting arms at as low a price as possible, and upon which they can get as large a profit as possible. That appears to be the view they take, as the arm is to be entirely disconnected from them. If I were in the gun trade, I should probably say "Very well. Those muskets go out at 14*s*. or 15*s*., and the sooner they go to pieces, the sooner I shall have another application for muskets."

721. Is it not the case, where a merchant asks for 20,000 stand of arms, that he asks for arms of a particular quality? foreign Governments, for instance, have arms of a particular quality; and is it not the duty of that merchant to get them at the cheapest price and the standard of quality?—Yes, I quite agree with that; but I know a case: I happened to be applied to during the time of the war between Denmark and the Duchies, to know whether I could point to any arms which were fit for immediate service; I did point to such arms, and I inquired what arms they were, and how they could be supplied in so cheap a way, and I found that they were made up from materials sold from the Tower, such as barrels, locks, and various things sorted together; they made a very respectable arm indeed; but when I looked at that arm, I was obliged to say, that it might answer very well for a merchant, but not for the Government.

722. You have stated that the price ranges from 10*s*. up to your price; suppose a merchant were to order a gun at 2*l*., do not you suppose that he is able so to protect himself that he shall not have a gun supplied which could be sold at 17*s*.?—One of the gentlemen told me, that from dealing largely in inferior arms the Birmingham manufacturers had lost the gun trade of America.

723. Do you happen to know that there is a large export to America even now of arms, paying a duty of 30 per cent.?—Yes; but what sort of guns are they? I am told that a double-barrelled gun goes to America for 3*l*., and that must be a very poor gun.

724. But other guns are exported to America costing 15*l*. each?—Yes, no doubt; but a large proportion are of an inferior quality.

725. You stated that the Birmingham trade, in consequence of inferior workmanship, had lost the American trade?—No; the good trade of it.

726. Still there is a large trade to America left; are you aware of that?—Yes.

727. Then they have not lost the trade?—Not wholly.

728. Colonel *Dunne.*] From your experience, if you were certain of a more regular supply of guns from Birmingham, would you think it advisable for the Government to give up the strict view which has been hitherto practised?—No, I cannot say that I should think so; I dare say there may have been faults in a certain degree, but the principle of the view I believe to have been well regulated and just.

729. Would you give up the strictness of your view?—Clearly not; it would be very costly to do that; if we gave up the views, instead of the arms lasting with rough usage, twelve years, they would not last eight in all probability; we see particularly when the work is not well done the arms give way; we see for example, that the sea-service muskets do not last so well as the line pattern muskets, because they are made in an inferior way.

730. Do you not think that it would be impossible to have what is called a regular demand for a certain quantity of arms every year, and that the demand, in fact, must be irregular according to the exigencies of the service?—It must be so; there is one misfortune in the gun-trade; if the Government change the arm as they did in 1842 and 1852, you have a large demand thrown into the market, and a great number of people go into the trade, and by and by, when you get towards completion (which was nearly the case with the 1842 musket, the smooth-bore percussion musket), of course there are more applicants for work in the trade, than the trade will then furnish; we were looking to that before this Minié change came, and meaning, with a view to keep the trade regular, if things were peaceable, to diminish the quantity of arms from about 40,000 stand to 25,000.

731. Do you consider that it would be very unadvisable to have a very large store of any arm, however much approved, now in the Tower at this moment?—Yes; I think it is the object to keep the store as low as is consistent with the defence of the country.

732. Therefore it is desirable to acquire the means of making a large quantity of arms when they are wanted on a particular occasion?—Yes.

733. Then you propose by this manufactory, to obtain that desideratum?—Yes, exactly.

734. But it is a sort of speculation as to what the effects of machinery will be in this matter?—Yes.

735. There is no actual certainty that the Board of Ordnance will actually perform this work if they have a manufactory?—One point which has led me to consider that it can be done, is the knowledge on authority that cannot be doubted, that the American Government has these factories now, and we know that in no government in the world is expenditure so closely watched as in America; and I know equally that the officers of that country watch with vigilance to see that they take no bad arms in.

736. Mr. *Muntz.*] Do you know anything with respect to the quality of the guns of their manufacture, and the relative price?—No, I do not, of my own knowledge; I have not seen one, but I have known Colonel Colt for some time, and I believe him to be a gentleman of character in every way; and when I talked to him, I said, "Our arm is a good arm, and I think our line pattern musket was the best musket in Europe till the Minié came; it is infinitely better than the Liege musket;" and as long as it was a question of hand-labour, I resisted in every way the idea of going anywhere else for arms; I am convinced myself that our own was the best.

737. Upon what authority is it that you have stated that America would not trust to machinery, unless they found their advantage in it, and unless they could make the arm cheaper?—They do make it quicker and cheaper; when the materials are brought together, they have a quicker setting up process. I believe I am correct in saying, if you take out the materials for 6,000 stand of arms, and place them in the hands of the setters up, it will be six weeks before they come back made up into good muskets. By machinery, according to the report of the gentlemen who went to America, it is shown that a musket may be stocked in about 22 minutes after the materials are put together, and that within 12 hours

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hours you may have a perfect musket. I say 12 hours, but I believe it is less than that.

738. You mean to say that you may have one perfect musket in 12 hours?—Yes.

739. But how many will you obtain in a length of time?—I presume the rate would be the same in obtaining the materials, but it is in the setting up that you would gain most in time.

740. Admitting that the setting up is accomplished in the time you speak of, how many such machines would you require to set up any large number of muskets within a reasonable time?—I cannot tell. I confess that I have not made that calculation; I have trusted there to a man who I believe understands the matter better than I do.

741. You are aware, are you not, that Mr. Whitworth only saw parts of the American gun work; he never saw them make the other parts, the machinery, or the barrels, or the materials?—No.

742. I was asking you how you estimated that the Americans produced so good an article for the relative price?—I stated that I had formed my opinion upon the testimony of Colonel Colt, whom I knew to be a man of integrity and honour, and he assures me that the musket made by American machinery is equal to that made at Birmingham.

743. Is it equal to the Minié rifle?—It is better than that; because really the last musket, the musket of 1853, is an improvement upon that.

744. Did Colonel Colt see one of them?—Yes; I sent him one.

745. Did he say that he could make rifles precisely of the same kind?—Yes; he said explicitly that he had no hesitation in saying, that with the machinery used in the Government factory in America, he could produce as good a gun as that.

746. He did not say that he had seen such a thing, did he?—He said that he had seen a musket.

747. But not a Minié rifle like that?—No.

748. Did he tell you what the price of the musket was?—No; he told me that it did not cost the Government more than 30*s.*

749. Are you aware that there is an account in print from parties who have stated the number of guns made, the expenses of the establishment, and the exact cost per gun, and that the cost comes as nearly as possible to 4*l.* a gun, they not being Minié rifles?—No, I was not aware of that.

750. Colonel Colt did not actually prove to you that a Minié rifle exactly like ours had been made by the American machinery at the same price, or a smaller price than we pay for it?—No; but after I had sent him a Minié rifle, I said to him, "Now, you have seen the Minié rifle, do you mean to say that you can by machinery, or rather that you do, in the manufactories in America, make as good a musket as that I have shown you, and that if you had a contract for such a musket, you would furnish one which should be as good in all its parts;" and he said, "I do."

751. But he did not give you the price?—He told me that they should be at 30*s.* under one circumstance, and 50*s.* under another.

752. Did he explain to you in any way in what part of the manufacture that great saving was to be effected?—Yes, it was to be principally in the labour; a diminution of skilled labour, and the greater rapidity with which you can bring the musket round.

753. Did he say in what part of the musket so great a saving was to take place?—No; he showed me, I think, that his sum for materials, coals, and so forth, does not differ very materially from ours; there is a slight difference, something between 10*s.* 9*d.* and 11*s.*

754. Did you compare your estimated cost at Enfield with his expenses?—No, I did not.

755. You obtained no real data from him, except that he undertakes to make 1,000,000 muskets for 30*s.* each?—Yes, I have this also, which it is fair to state. I have seen his factory, and I think it will be admitted that any machinery which will make good pistols, may be enlarged to make good muskets.

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756. Lord *Seymour.*] Do you propose, in erecting this new costly establishment at Woolwich, to do away entirely with the establishment at Enfield?—Entirely, and that at Birmingham also; and there would be very little to do, I should think, at the Tower.

757. Do not you make swords at Enfield?—Yes.

758. Will the making of swords be removed to the new factory, or do you mean to give up the manufacture of swords?—We only make a small number now; they are almost all made by contract; for example, the naval swords, the yeomanry swords, and some other swords. The principal swords made at Enfield are for the regular cavalry.

759. In the new establishment, do you mean to make swords?—Yes, as far as we go. Now, I take it that it will be advisable at all times to contract to a certain extent for swords. It is an article of which you can regulate the production, and I do not think the inferior sort would be brought into that factory.

760. Have you found any difficulty in manufacturing swords, from strikes arising among the men?—Yes, we have; still we are going on better with them now; we have two contracts out, and they are coming in. One thing I must add, we are indebted to the Honourable Member for Birmingham for improving the sword, and giving to us the benefit of his skill and science; and we have an excellent handled sword, much stronger than existed before, in consequence of his suggestions.

761. The new musket takes a larger charge of powder than the musket of 1842, does not it?—No, it is smaller. The musket of 1842 had a charge of 4 ½ drachms. The Minié pattern 1853 has a charge of 2 ½ drachms.

762. What charge had the one of 1852?—The same; but the original musket, called the Minié, which was made on the Belgian pattern, has a larger charge of powder, and a larger bore.

763. In the manufacture of barrels by machinery, is it contemplated to make twisted barrels at the factory?—No.

764. Mr. *Muntz.*] Will you explain to the Committee the nature of your manufactory in Birmingham?—It is principally for viewing; but jointing and percussioning is carried on there also. The percussioning forms the percussion lump into a good shape, ready for piercing for the nipple, and the jointing fits the lock close to the percussion lump, and the whole of this is done by machinery.

765. What was the object on the part of the Government in undertaking to do the work?—It was to reduce the price; that was an arrangement made by Mr. Lovell before I went into the Ordnance; I found it there, and there is no doubt that it was made because it enabled him to carry on that part of the business with unskilled labour, not only more cheaply, but more uniformly.

766. Mr. *Newdegate.*] Will you state to the Committee whether you are not aware that, during the period when those difficulties have arisen in the supply from Birmingham, there has been a very great change in the prices of materials and labour, and a great general interruption in the trade?—I am quite aware of the rise in the price of provisions, but I could not trace that that entered into the question of the disagreements, between the masters and the men.

767. Are you aware that there has been a general change in the cost of materials and the rate of wages within the last three years?—Yes.

768. And that was the period during which those difficulties arose in the supply of arms?—With regard to the first difficulties in 1851, I think there was no material change in the value of provisions at that time.

769. But the subsequent difficulties have been during a period of great change in the prices of materials and the cost of labour?—No doubt of it.

Mercurii, 15° *die Martii*, 1854.

MEMBERS PRESENT.

Sir William Molesworth.	Lord Seymour.
Lord Paget.	Mr. Monsell.
Mr. Muntz.	Colonel Boldero.
Mr. George Dundas.	Mr. Geach.
Colonel Lindsay.	Colonel Dunne.
Mr. Newdegate.	Mr. Walpole.
Colonel Maule.	

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Mr. *John Anderson*, called in; and further Examined.

Mr. *J. Anderson*, 15 March 1853.

770. Mr. *Monsell.*] WHAT did you mean by stating, in answer to Question 390, that you had no knowledge as to the wear and tear of muskets made entirely by machinery?—I hardly remember that that question was put to me. If it was I dare say I answered that I did not know much about it. I imagine the thing to stand thus: A musket made by machinery would be much more nice in the fittings, that is, the holes that have to be square and flat, would be more flat and nearer to being perfectly square if made by machinery than if made by hand; and if there was any difference in the sustaining of wear and tear, it would lie in favour of the one made by machinery, as the parts would fit each other better if produced by very accurate machinery. There would not be much difference in that respect, but, if any, it would be in favour of the machinery.

771. What did you mean by stating, in answer to Question 363, that you did not know anything about a gun?—I do not know much about a gun, but for the last 12 years I have made all the brass cannon for the Ordnance, and have made it a point of duty not to know anything about cannon. I have introduced all the machines except two, contrived them and made them, and I have suggested alterations in cannon, but I have made a special point of not knowing anything about cannon. The same with fuzees. I am engaged in designing machinery for fuzees, and I have made machinery and suggested alterations for them, but I do not interfere with a fuzee as a fuzee, for I know nothing about fuzees; that is a wide subject, and there is a great deal said about it among military officers, and the same about the comparative merits of different guns, but I steer quite clear of the guns; I see the thing to be produced, and I try to find out the quickest and best way of doing it, nothing more.

772. You do not consider yourself competent to decide what sort of fuzee is the best to use; but, when the best is submitted to you, you think yourself competent to give an opinion as to the best mode of making it?—That only.

773. Referring to Question 391; have you consulted any of the military authorities at Woolwich as to the alterations which you propose to make in the curves of certain parts of a musket?—Yes, I have done that, and I think that all who know anything about muskets will agree with me in the alterations which I have suggested. They hardly, perhaps, deserve the name of alterations, and there is not one in the room, perhaps, who would detect the alterations I wish for. For example, this corner of the curve is different from that (*exhibiting a brass fitting*), not intentionally, but just because it happens to be so; there is no reason why it should be so; and this curve is slightly different from what it is here and there (*describing the same*). If we examine it minutely round, we find that there is no regularity in it; all I want is regularity, so far as curves are concerned, and a thing with perfect regularity could be done for a quarter of the sum for which this particular definite thing could be produced. Here there are many curves which it would be rather tedious to produce; it could be done, but it would be much more expensive.

774. You stated that you had invented a great many new machines at Woolwich

wich and Waltham Abbey. Will you state to the Committee whether you invented anything for the percussion-cap machinery?—Yes; I made a whole plant of machinery for making percussion caps, but that embraces a great many different machines. That is just the thing that would be introduced for making the parts of a gun. I forgot to mention that before.

775. What estimate did you make for that machinery?—It was introduced to me in this manner. I was asked whether I could make a good percussion-cap machine for 600 *l.* I said I thought I could, and after I had had a day to think about it, and to examine the whole question, I thought I could make a percussion-cap machine for 600 *l.*; but after going into that matter I found that there was more to do, and I introduced many things that I did not think of at first, and it came to close upon 700 *l.*

776. Have you not invented some entirely new machinery for making elongated bullets?—Yes.

777. What was the estimate in that case?—When I was first spoken to as to how much it would cost to make a machine to produce 100,000 a day, I said I thought 1,000 *l.*; and after thinking over it for three or four days I still thought so; but it is difficult to say beforehand what a machine will cost if it is not all designed, and then it is very difficult to say, but I said I thought 1,000 *l.*

778. How much did it cost?—Those machines are furnished, producing, I may say, from 100,000 to 125,000 a day or 10,000 per hour, but though they have been doing that, still they are not quite finished; we have spent 930 *l.* upon them, but I could easily expend a great deal more upon them to bring them to the state I should like to see them in.

779. What saving have they occasioned in their present state?—The answer as to that question is just this; that before, those bullets cost the Government 25 *s.* for 10,000, that is 2 *s.* 6 *d.* per thousand; now the present cost for wages is precisely 1 *s.* 2 *d.*, nothing more nor less.

780. Did you not invent a machine, a sort of hydraulic press?—I have made several great hydraulic presses; I think the second, next to those for raising tubular bridges; they are nearly as large, but in that particular case we overran the estimate; that is, they were said to cost 1,000 *l.*, but they came to 1,200 *l.*

781. Did you not, in the course of last year, invent a machine for changing cylinders into cones?—Yes.

782. What was the estimate for that?—It was estimated to cost 500 *l.*, but it was another machine altogether that I thought of doing the thing with at the time, a very important machine; it was intended to convert a cylinder into a cone; it was thought impossible by all that I spoke to on the subject; I thought it possible to do it in the way that I had seen something done in Birmingham, and after making experiments, I found that I could do it, but that it would be very expensive; this machine that has been made is very much simpler and perfect, and only cost 300 *l.*, the operation is performed by a machine that costs very much less than that kind of machinery which was anticipated at first.

783. Generally speaking, the estimates that you have made of machines that you proposed to invent, have been tolerably correct, have they not?—That wants explanation, because a machine may cost anything. When an engineer gets an order to make one, if he has only a certain sum to work upon, he stops short at the point when he expends his money, and he would not make it so perfect as he would otherwise do; for example, I could spend 200 *l.* upon the bullet machines, and make them so that they would take away the bullets themselves, and do several things that are now done to them.

784. Still your machines have produced considerable saving?—Very great, but still what you could do is quite another thing to what is done.

785. Lord *Seymour.*] You went down into the manufacturing districts on account of the state of the laboratory, did you not, on one of the occasions?—Yes.

786. When was that; was it the last visit?—Yes.

787. You went down, did you not, in consequence of the arrangements of the laboratory not being in a satisfactory condition?—I consider that at the present time they are very unsatisfactory.

788. You consider that the state of the laboratory is at present very unsatisfactory?—Yes.

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789. And that there is a large unnecessary expenditure in consequence; is that so?—Just because they have not got machines to do what they now do by hand. The system of 50 years ago goes on in many of the processes just the same as in the gun trade.

790. The Ordnance having had the laboratory in their own hands, have allowed it to remain in the same condition as the gun trade, which is, according to you, 50 years behind any other trade in the country?—Yes, I think it is. It is behind the cotton trade 50 years in certain parts; it is behind, speaking of the parts that are to be improved now.

791. Is the gun carriage department in a satisfactory condition?—I do not know that there is anything in Great Britain before it in that respect. It is in a very good condition; but still there is much to be done there.

792. In the way of machinery?—In the way of just having quicker methods to produce the things that they now make.

793. With regard to the amount of wages in those different departments, do you think that by the introduction of better machinery we may hope to reduce the large amount which is now paid for wages in those different departments?—Just looking at it in this broad light about wages, that is a subject to which I have not paid any attention; but looking to special things, I could make them for much less wages.

794. Was it not the object with this improved machinery to reduce the amount of wages; to employ fewer persons, very few skilled labourers, but to employ a number of unskilled persons to manage under them the machinery?—Yes, I hope it will come to that.

795. With regard to the laboratory, I find that the estimate taken for wages was 28,000*l.* a year?—That I do not know anything about; I am not at all acquainted with that.

796. Which department are you acquainted with?—So far as wages are concerned, I am not at all mixed up with them; I know all about tools, and the ways of doing things.

797. You recommend the introduction of machinery for gun making, do you not, with the view of reducing the cost of manufacture?—Yes, just so.

798. That is, by diminishing the amount paid in wages?—Yes, that is the light in which one in the Honourable Member's position would look at it; but the light in which I look at it is merely whether I can make this cheaper by hand than by machinery, and I think I can make it for a tenth part of the sum that I could do it for by hand. The question of wages is an important one, but it is a part of the subject that I have paid very little attention to, though my remarks of course bear upon that and apply to that.

799. Have you not given the amount of what you consider will be the wages in the new department that is proposed?—Yes, I have done that.

800. You reckon the wages at 32,000 *l.*?—Yes, that is, to the best of my judgment; I thought a great deal about it, and I think that is not over what it may be.

801. You are not able to calculate with regard to any department now existing, how far you could reduce the wages by improvements in machinery?—If we go to particular things, I can do that. If you take the making of anything, 1,000 of these fuzees at the present time, when filled, and with every thing done to them, cost 30 *l.* 12 *s.* 1 *d.*; it is a certain kind of fuzee, and it costs so much because it is entirely made by hand; it must be very accurate. The most of the wages, or a great portion, is spent in gauging. Now gauging does not do any work, it merely finds out errors, and a man will do very few in the course of a day. We have heard of the bobbin machines of Paisley, that will turn out 14,000 of a thing in a day, and we have put ourselves in communication with the makers, and they say that they will give us a machine that with one boy will turn out his 10,000 a day, and if we go to work in the same manner through the whole stage, I hope, indeed I cannot see our way to spend 4*l.* over it, instead of 30*l.* 12*s.* 1*d.*

802. In the case of wooden fuzees, the public department of the laboratory may gain great advantage by copying private manufacturers?—Yes.

803. You stated that you made it a point of your duty not to know anything about a cannon?—That is, to put in my word as to whether a cannon should be this

this way or that way. That is a subject which the officers who have deeply studied the subject of cannons have discussed, and there are very strong opinions upon the comparative merits of howitzers and guns. When they set down drawings and they are brought to me, I say, if such and such a moulding were removed, I could produce this cannon very much more easily. Then the designer says, that has nothing to do with the gun; it can be done. Then I say, I can produce the gun that is brought to me if that is done, and for the sake of getting it done quickly this alteration is made. The same remark applies to fusees. I said, if this was taken off (*pointing to the fuzee*), and I could not see the use of it, I could produce fusees much cheaper than with this upon it. The inventor at once saw that it was of no use, and he, after consulting with the authorities, got leave to have it taken off. Now, that will be produced in consequence more easily.

804. With regard to the vent of a cannon, might not a good deal of improvement in that respect lead to economy?—I have done a good deal in that, and I think I have improved it very much.

805. That is a sort of point which you, who make cannons, would hardly be ignorant of?—No; I have made suggestions about the vent, and they have been adopted; still, I should not think my judgment sufficient to alter them myself.

806. You would recommend the mode by which you thought they might be improved?—Yes, I have done that, and it has been adopted.

807. Just as you now, without knowing anything about guns, recommend the mode in which the different parts of a gun should be altered?—Yes, just on the same principle.

808. You recommended to the Ordnance, on the 23d of December 1853, that you thought it desirable to have at least a single set of American machines for the manufacture of stocks and locks, adapted by their makers to our muskets?—Yes.

809. Do you mean that it would be advisable in the first instance to see how far one set of machines would produce a stock and lock according to the Ordnance pattern?—My meaning is something like this, that to go to work to originate a set of machines to do these works, is not an easy task; it could be readily done, but not easily. We have so much to do just now, that I thought it would be losing time just to go over the ground that has been gone over during the last 12 years, and I thought the best way would be to get a set of their machines, to see what they have brought them to.

810. What number would you require?—As many machines as would be necessary to produce one stock.

811. One for each of the parts that are produced by machinery?—The set might embrace three or four of some machines, and one of another. I happen to know from the report of the Commissioner, that some of the American machines over the ordinary operations are some six or eight minutes, and some six minutes, others three minutes, others only one minute; probably one of one kind might be required, and eight of another.

812. Can you state whether any progress has been made in procuring a set of machines in order to try their effect?—I was going to America in order to see what they were doing when this Committee was appointed, before doing anything, and with instructions not to do anything, unless we saw that it was really what was desirable should be done.

813. With regard to the building, you stated "the cost of the building is better known, because we are already in contact with the contractors." Did you mean by that that the building is already contracted for?—No; in order to make out the estimate, we went to the contractors to see at how much per day for the building they would supply iron work and wood work to complete it, and by so doing, we could calculate, if not with perfect accuracy, within 1,000 *l.* of what the building will come to, of whatever size it may be, and reckoning it in this way, it comes to about 43,000 *l.* Then adding to that a great many things that will be wanted besides, together with the brickwork of the furnaces and some chimnies, we thought it would come to somewhere between 47,000 *l.* and 50,000 *l.*

814. Out of that 50,000 *l.*, how much is for the foundations?—The officer of the engineers, who has been boring for the last few weeks, seems now pretty well

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well satisfied with the nature of the foundations, and he will be able to give the Committee much better information than I can.

815. You stated, that any person in visiting Birmingham is struck with the number of individuals carrying about the different parts of a musket?—Yes.

816. Does it not arise from the mode in which the orders are given to different persons who contract for the different parts of a musket; and is not that a necessary consequence of the system?—I have not any acquaintance with the giving of the orders; I am not at all mixed up with that. I suppose, if different parties in different parts of the town get several different parts to make, it would come to that.

817. Therefore, apparently, if you gave orders for different parts of the musket in a town, they must be made in different places by different persons, and carried about the town?—Yes, I should suppose so.

818. Mr. *Muntz.*] Are you aware whether those muskets which you saw carried about the town were Government orders or not?—I have not the slightest idea.

819. Lord *Seymour.*] You stated, with regard to the barrel, that it would be made on a very much more economical principle than heretofore?—Certainly. I observed that the most of the muskets passing through the town were in the neighbourhood of the small armoury department in Bagot-street; and as you come towards that, you see them thickening more and more.

820. Did you consider that they were Government muskets you saw carried about, or were you aware that they were not Government muskets?—I could not give an opinion upon that.

821. Mr. *Geach.*] Do you know that the trade of Birmingham generally is divided and subdivided to a very great extent; that the parts of one article are subdivided into eight or ten manufactures, and then brought together and made into a finished article?—I have heard that; and I should think it a very good plan if they were near to each other, just to save the time of going between.

822. Do not you suppose that in Birmingham, where this trade has been carried on for years, private individuals have found out what was best for their interest?—I should think they would, and that they ought to find it out.

823. You stated that this attracted your attention at Birmingham, and you also stated that you visited the cotton manufactories in Manchester; did you observe in Manchester the same carrying about of materials?—No; there are materials being carried out there; but the cotton goes in at the one end and comes out perfect cloth at the other.

824. Do you know that in Manchester the spinner of the yarn does not necessarily weave the cloth?—Yes; I was brought up to the cotton-machine making.

825. Then you know that the maker of the calico does not print that calico?—Yes, in some cases.

826. Do you know that the same person does not dye?—Yes.

827. And the trade is subdivided to a very great extent?—Yes.

828. Those things are carried from one place to the other; did it strike you that that was a bad arrangement for the cotton trade?—No; I would not think it so bad for that trade, because it is done in a much more wholesale manner. The dealer gets his goods in wagon loads; it is different with the musket trade.

829. You have probably heard it stated that there are 300,000 stand of arms made in Birmingham in a year?—Yes.

830. That is a large trade; and out of that trade what has been supplied to the Government has been a very small quantity, say 20,000 in a year; do not you suppose that the persons engaged in the trade would have found out whether it was better to have all those parts made together, or whether it was better to have them subdivided?—I should have supposed that they would have found that out. But I have been speaking to some of the gunmakers who are interested in the present system, and they acknowledge that it would have been better if they had had more machinery to assist them, and if something approximating to the plan that I am proposing had been adopted, just bringing them together more, so as to save the running about; and I think they would have been the better for it.

831. The question is as to this carrying about that you have mentioned, and if, as you agree, the Manchester cotton spinners know their own interest, is it

not

not reasonable to suppose that the Birmingham gunmakers, after a long time, have found out their own interest, so far as that part of the question goes?—I would think that they would have found it out to get nearer to each other, though I agree with the Honourable Member in the value of subdivision of labour to the very greatest extent.

832. The first reason that you gave why it was desirable to form this establishment at Woolwich was, that you then would have the advantage of taking the iron in at one end and bringing out the gun at the other?—I think we shall save by that very considerably, and I think there can be little doubt about that in the mind of any manufacturer.

833. Mr. *Muntz.*] Do you think that there is any comparison to be made between cotton weaving and gun making?—I really think that the nearer we can bring all our machinery to the system carried on in the cotton trade the better we shall get on.

834. Where is the comparison between cotton making and gun making; is there any?—Yes.

835. What is it?—In the first place the cotton trade is divided into an immense number of different machines, each carrying the fibres of the cotton just a stage further foward; which is the very thing I would like done to any separate piece, and that we should have our skutchers and other machines, just putting them a little and a little further until we have them made perfect. The former system was to have a machine to do a great deal; I think that the time for that is gone by, and that simple machines, just to do a little, and to do that well, and always do it the same, are what is wanted; and that is what they have in the cotton trade.

836. The cotton trade does not embrace between the spinning and the weaving more than two different trades; but many trades are connected with the making of a gun; 10 different trades, completely different within themselves, and all done by different parties?—With all deference, I think that the distinction of trades belongs to a former age, and that there is no such thing as trade in the matter. It is a question of producing a musket composed of some 50 or 60 pieces; and to have each of these sets of machines to produce a given article, will be the cotton manufacture on a small scale.

837. I suppose you will admit that cotton is cotton, and that a gun is made of different materials, iron, brass, and wood?—They cannot be compared so far as that is concerned.

838. Is it not probable, when half a dozen and distinct trades that have been always kept separate are carried on for making one article, that the process must be carried on on a different principle from that of a simple trade, like the the cotton trade, which is spinning and weaving?—Take the steel pen making; that comes a bit nearer. That trade is composed of several trades, if I may use that term. There is the getting of the steel in sheets, there is the rolling of it, the cutting of it, and then there comes the cutting out of it. Then come all those various processes which pens go through, until you come to the hardening. Then you come to the tempering, and then comes the box making, and a great many things connected with the boxes, which all go to form the trade producing steel pens.

839. Still it is steel?—Yes; but there is the wood for the handles, and then comes the most ingenious machine in Birmingham for making the handles of steel pens; there we have three materials, steel, wood, and paper. In the gun we have steel, iron, brass, and wood.

840. Are the gun trade and the cotton trade the same?—The Honourable Member could not fancy me so absurd as to say that they are the same. I say that I should like the same system carried out in making guns as is carried out in making cotton.

841. With respect to the machine which it has been stated you invented, will you state how the bullets were made before you made the machine?—They were cast.

842. They were cast in the dockyard, were they not?—No, in the arsenal.

843. You only know what they cost, I presume, as compared with the Government manufacture?—Only that.

844. You never heard of such balls being cast elsewhere?—I do not know whether those balls were cast elsewhere in a wholesale manner, because they are very much more difficult to cast than the round bullet.

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845. The comparison of your machine was made with good or bad work in the dockyard?—Yes, nothing more.

846. Did you reckon anything for the expense of the machinery, or interest on capital, or wear and tear, when you stated the cost of making the bullets?—Nothing, only the wages.

847. The wages of the men who put the lead into the machine, and took the balls away?—Yes; there is a man at high wages, and two lads at low wages.

848. Did the man at high wages keep the machines in repair?—He just looks after them; he could do that; he rectifies the dies when they get out.

849. I presume working on so soft a metal as lead, the dies do not get often out of repair?—No, but sometimes they wear a little.

850. There cannot be a great deal of wear and tear in the case of so soft a metal?—No.

851. The principal expense is the original outlay, the capital employed, and the superintendence?—Yes.

852. With respect to percussion caps, will you state whether you know at what price you make the percussion caps compared with the general price in the trade?—I do not know.

853. Have you any idea of what the cost now is?—I was supplied with that information, but I have not got it with me; although these machines do moderately well, still something immensely better could be made; now that there is a steam engine, I would make them in a different way altogether.

854. What do you contemplate doing by steam machinery?—I would roll a broad sheet with proper steel rollers, a sheet about six or eight inches in breadth, and this sheet would pass between a pair of rollers, and then a row of punches, with a punch within a punch, so that the one would just knock it into a blank, and the other bring it into the perfect thing at one operation.

855. As it passes through the rollers?—Yes.

856. Did you ever try anything of that sort?—I saw in Birmingham something that would do the thing uncommonly well; not rolling; the rollers were merely to feed the copper to the right pitch.

857. Is there to be any pinch upon it to make it the right size?—Only a little.

858. Shall you save anything by that?—In making the little cups for the Minié bullet, we should save to a great extent by using a double punch, one to cut the blank, and then one in the inside to knock it down through and finish the thing; they would be cheaper.

859. Are they made of copper?—They are made of iron; but we could make them for a quarter the present price, and they could be much improved.

860. With regard to your proposed plan of making arms by machinery, one of the advantages which you have told the Committee that you contemplated was a considerable saving in the coal that you were to use in this manufactory, and the saving was to be effected by taking the fire, after being used for the various articles, into the steam engine?—Yes; and using the stack boilers, that are now getting so common.

861. Have you ever made any experiments in that sort of work, where you wanted to get a complete welding heat?—Yes; we have some at work in the arsenal.

862. What sort of work do you refer to?—Forging; great wrought iron forgings.

863. Did you ever try, where you wanted to make a long weld, the same as in a gun barrel?—No; but the furnaces we have would do gun barrels very well.

864. Have you made any experiments?—We have those at work which would do.

865. Have you made a gun barrel in that way?—No; but we have made things like them.

866. Assuming that you are going to effect a saving, what do you contemplate it will be per annum?—I have not gone into that.

867. What saving per annum do you calculate upon?—I have never gone into the saving.

868. You have stated how much coal you will use per annum?—Yes, I can tell that; but I have not thought of the saving.

869. Can you give the Committee an idea of what proportion the saving in the coal will be?—I will suppose, if we go to work with the proper engines,

engines to turn the rollers, we should have condensing engines, not the pres nt ones which we are going to use.

870. Why not?—I am getting the present because they are cheap, and we have plenty of steam to drive them with, for I have plenty of heat to spare to work them; but supposing we had condensing engines—

871. Why?—Because then I would have to pay for the coal; I have nothing to pay for it in this way. I will calculate what it will cost, providing we did not use the stack boilers; I think we should want 60 horse power; and suppose we work at four pounds of fuel per horse power per hour, it would be about 1*l.* a day, 2,400 lbs. a day; we should use about the value of 1*l.* a day, or nearly that, in the furnaces; the other might be a little greater in getting in a 60 horse engine; there will be a little saving, and the saving will be about 300*l.* in a year.

872. What do you reckon the price of coal at?—We have had it from 18*s.* to 1*l.*, and a guinea.

873. Do you know what the price of coal is at Birmingham?—I should suppose very much cheaper.

874. How much cheaper would the coals be to do the same work?—I do not know the price of coals in Birmingham.

875. Then how can you reckon upon such a saving in your manufactory, if you do not know the comparative prices of fuel?—I quite allow, if we take it as a whole, that coals are cheaper in Birmingham, and if the whole of the coals should be expended in Birmingham, it would come to less money than in London.

876. You have stated, as one inducement for laying out this money, that you will save so much out of the coal; and you have stated that you are to consume at the rate of a ton a day, which is very moderate, and out of that ton you will have a saving; supposing you are allowed 500*l.* a year for coals, what shall you save out of that?—The coal question is so trifling; I brought it forward just because it formed a part of the expenditure, and supposing that the coals come to double what I have put it down at, it would only amount to another 8*d.* per gun. I could shortly give you the whole calculation.

877. Supposing you have 500*l.* for coal, you state that you will effect a saving; what per centage will your saving be?—I will save 300 tons in a year, supposing I get a thorough good condensing engine; with a double cylinder, to work expansively, with a common engine, it might be about double or treble of that.

878. According to that, the remainder which you do not save, would be about as near as can be what it would cost at Birmingham?—Yes.

879. And you would have no saving at all?—Yes, I allow that; but it is so trifling, I merely stated it as a fact.

880. You stated, did you not, that you had seen some of the Birmingham work, what Birmingham work did you see?—I would only like to tell the Committee the name where I saw good things.

881. Only the gun trade?—I do not think it is well to mention names, but I saw Mr. Clive's works.

882. Whose works besides did you see?—I saw Messrs. Brazier's works, and very nice they are, so far as they go, if they had but a little more machinery. I have seen a number of others; I think I saw Mr. Turner's works.

883. What did you see there?—He carried on an extensive stocking and rifling, I think.

884. Were those the only three that you visited?—No, I saw more; but I forget the names. There was a bayonet works, not very extensive.

885. Whose was that?—A gentleman who has been very long in the way, Mr. Stephen Hill; but I do not recollect the names.

886. Who recommended you to go to those works which you visited?—I got an introduction to some of them from Captain Tindall, of the Bank of England there, and some of them from Mr. Lovell.

887. Did Mr. Lovell tell you whether there were any more to see?—I do not know that he did; I wanted to see the best.

888. Did you ask Mr. Lovell to show you the best?—I forget the language I used, but that was what I wanted. Lieutenant Warlow was with me, and he gave us a letter to them.

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889. You saw Mr. Clive's barrel-rolling, did you not?—Yes, that was the first time I saw it.

890. What did you think of it; had you any objection to make to it?—I was rather surprised at the waste of the steam. The rolling of the barrels was conducted very nearly in the way in which I would like this to be conducted: there was not quite that division of labour which I should like to see carried out, but there was a great waste of heat there. In the first place, I think some of their boilers are open to the atmosphere, but I do not like to say anything about any place; I would rather not.

891. Did you see anything else at Mr. Clive's worthy of note?—Every thing that was good there I saw and admired. The system of boring barrels is the same as we have at Enfield, but I hope something better than either can be introduced.

892. What objection have you to the system of boring?—I think it too indefinite.

893. Do you mean to state that they do not bore the guns to the gauge?—Yes, but it is altogether a system of trial and error, and bringing them to gauge; there is nothing definite in it. I think something better than the present mode will be introduced.

894. Have you ever tried to bore a gun barrel?—No, but I have bored a great many other holes; I never bored a gun barrel.

895. Have you seen them bored out at Colonel Colt's factory?—Yes, I have seen that.

896. Do you approve of the sort of tool that he uses to bore the barrels out?—There was one part I did not like altogether.

897. Would you recommend that a gun barrel should be bored in the same way as he bores a pistol barrel?—No.

898. You are aware, are you not, that Colonel Colt finishes his gun barrel precisely in the same way as they do in Birmingham?—Yes.

899. Do you object to that mode?—I hope to get over that.

900. What tool should you recommend?—I have not made up my mind.

901. Have you ever thought of any tools?—Yes, I want to get a tool to bore a straight hole, and to bore a crooked hole into a straight hole; I have been thinking of several tools.

902. Have you got one to do that yet?—I have not had an opportunity to try it.

903. Supposing you obtain one, what then will be the cost, as compared with the present plan?—I should think we could get into a quicker way of doing it.

904. You only think so?—I can only think so.

905. Then it is all assumption?—Not altogether.

906. Have you examined the inside of some of the best barrels?—Yes; but I do not know much about that.

907. Can you tell whether a barrel is straight or crooked?—A gun-maker has tried to instruct me in detecting the crook, but I am not a proficient in that. I think that a tool can be made that will bore a straight hole.

908. In such a substance of material, without altering the hole?—I am in hopes that it can be made to do that.

909. You say that you do not know much about the expense; but you hope that it will be less expensive?—If the plans that I have been thinking of will answer the purpose, I think we shall do it at a very low figure.

910. At what figure should you say?—I cannot pretend to that. I do not pretend to anything more than any one in my circumstances could be supposed to know. I have seen the present, and I think that it is a very rude system, and it has always struck me that something better could be done. If we have it to do, we will make most vigorous efforts to try to do it; but, if we cannot do it, we shall only be where we are, and the machinery that we use would fall into present way.

911. And fall into the same cost?—I have provided in the estimate a very much larger sum for boring machinery than would provide the present machinery. I expect that what we shall require will cost more, but I think we shall produce a perfect barrel without straitening.

912. Do you expect that any tool you can invent will bore a hole in a barrel of that slight substance without making the hole crooked?—I cannot speak with confidence

confidence upon that; but we have consulted engineers, I should say, as good as any in the world, and they think they could. Mr. J. Anderson. 15 March 1854.

913. Do you think that engineers know anything about boring a gun barrel?—They know pretty well.

914. You stated, did you not, that you wished to have a tool that should turn a perfectly correct and true barrel, without having the disagreeable process of wiping it upon the stone?—Yes.

915. Have you ever tried to do it?—I have no doubt about it, but I have not tried it.

916. Have you ever turned a gun barrel?—Never; but I have seen them turned many times.

917. You never saw a difficulty with respect to turning them?—I have no hesitation in saying that it will be done.

918. If they are to be turned true on the outside, they must be true on the inside, I presume?—Yes; that would not be done at once; it would be the result of a series of borings, one after the other, so as to approximate to the truth, by having a series of barrels revolving; the cost of watching them would be very trifling.

919. Is not that the case now?—Not exactly; they first turn them, and after being bored, they are bored again, and then they are ground to truth.

920. Are you sure that they are all ground to truth?—No; all that I have seen have been done in a certain manner, and I think that they could be done in a very much better manner.

921. You do not know that at present gun barrels are turned complete and perfect, without being put upon the stone at all?—I have never seen any done in that way.

922. If they are so done, do you propose to reap an advantage by adopting such a principle?—Most assuredly I do; if it is already practised, and I come to know of it, I would adopt it at once.

923. What will be the use of your adoption of it now; if it is already done as you propose to do it, where will be the advantage in your doing it?—If they are done in the way in which I would like to do them; and done in a better way than those that I have seen. If I could find out a quarter where they are so done, I should at once adopt the principle.

924. What will be the use of your doing it at all, if it is now done by other people upon the perfect principle that you recommend?—Though other people have done it, if it is a good plan, it should not make any difference to me; there is no reason why we should not adopt it.

925. Is not one of the reasons assigned for recommending the Ordnance to lay out a large sum of money for the purpose of making guns, that you, by the application of new principles and better machinery, will be able to make guns more perfect, and at a less cost?—If the system which I would like to carry out is already in operation, it does not cheapen our musket; we still pay a very high price for a musket; but if the system that I should like to see carried out was in operation, I am sure we could do it very much cheaper.

926. With what do you make your comparison; what is the price with which you compare?—Just taking it as a whole, and what I hope we shall make it at.

927. Do you think you will really make it cheaper?—There is no certainty in anything that is not done; I am sure the Government could not lay out money to better advantage; I cannot prove it very well.

928. Then you hope at one end, and you are sure at the other?—If there is any certainty in anything that is not done, I think we may feel warranted in saying almost positively, that if machinery is applied to do the parts that are now done by hand, they will be done much cheaper.

929. Have you any means with respect to any other gun, made by anybody else, by which you can make a fair comparison?—I have not been much mixed up with guns; hardly at all; I have not pretended to be very much acquainted with guns; all I say is, that if guns are to be produced, they can be made cheaper by machinery than by hand.

930 You cannot state in what proportion a saving will be effected?—No more than in the evidence I gave the other day; I gave data which I thought might guide us.

931 You have a gun here, and one of the best guns; and you have examined, I suppose,

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I suppose, one of those Minié rifles, such as the Government wish to have made; how do you find them turn out?—Those that I have examined were made at Enfield.

932. Have you not examined those made at Birmingham?—No; but I heard the Birmingham guns spoken of very highly. On examining this gun (*pointing to the same*), I do not think that it could be made for the sum that is charged at Birmingham; it is so well made. The gun I had was a sample gun, just one as well as could be made; but to make two guns precisely the same as that would cost a great deal. I have heard of gunsmiths making guns for sportsmen; but if they wanted two sets of barrels to fit one stock, they would charge considerably more; but if the parts were made by machinery, that difficulty would not exist.

933. Do you mean to make all the parts of the gun by machinery?—No.

934. What parts will be made by hand?—I would do as much by machinery as I could, and I would stop when I could not go any further with advantage.

935. With regard to Colonel Colt's manufactory, are you prepared to state that the parts are all made by machinery?—No; but a vast deal is made by machinery.

936. What part is there that does not come into hand labour after it has been made by machinery?—To take one of the most important parts, namely, the cylinder, with the six holes in it, most of that is done in the machinery.

937. Still there is hand labour upon it afterwards; is there not?—There is no one that says you would not use hand labour to do what hand labour did better than machines, but by using machines to do the greater part of the work; and hand labour puts the things together; the machines bring it up to a certain point, and it would be wasting machinery to keep it doing that very slowly, so as to take off the mark of the tool.

938. It would appear that you propose, in the manufactory which you propose to establish, not only to make the machinery applicable to the gun, but to make the gun applicable to the machinery?—Not necessarily.

939. Did you not say, in the first place, that you would make the butt end of the gun semicircular, so as to be able to cut it out better?—No, that was not the meaning; some suppose that; at any rate I did not mean that. I meant this, that taking any of these as the circle of this thing (*pointing to a brass fitting*), that should be the circle carried out, any of them; and supposing this point is correct, then it would be a circle that covered the whole of it, the same curve; but the circular cutter that did this part (*pointing to the fitting*) would pass over, and come round and end off at nothing here, and then to this (*pointing to the same*) with a flat instrument.

940. Is not that making the gun suit the machinery, as well as the machinery suit the gun?—When I first began to make a cannon, I said what I have said about this; some said it was bringing the cart to the horse; I said, "Admitted, but I will make a much better and a much cheaper gun."

941. Are you aware that other people are tied down to make a gun to a particular pattern?—If that is done by hand, it does not matter.

942. Supposing that instead of keeping to a pattern, the Birmingham gunmakers were allowed to make it to suit their convenience as you propose, do you think that they could not reduce the price some 35 *l.* or 40 *l.* per cent.?—I do not know that they could; but if they introduced machinery, I say that it would be very much to their advantage.

943. Do not you think if they made the gun so as to suit their own convenience, instead of according to the Ordnance pattern, that they could make a much cheaper gun than they do now, with the strict injunctions that they lie under?—I have never been mixed up with that at all.

944. You suggested the other day, that the cock of the gun which you hold in your hand, should be made of a different form to suit your machinery; what do you propose to do in that respect?—I would like it more like those in the higher-priced sporting guns; they come nearer to what I think is the right form, a straighter lever. This curve (*pointing to the same*) is of no particular use; it is looked upon as a beautiful figure, but it is of no service whatever.

945. Do not you know that the object in having it of that form is simply to bring the cock over the nipple of the gun?—Yes; I would only alter this connecting part.

946. You

946. You refer to a double fowling-piece, do you not?—Yes; I have very little acquaintance with them, but I have seen the cock of the fowling-piece, and the lines upon that just seem to please better than this.

947. In a fowling-piece the cock is not brought to the exact centre of the barrel?—Yes; but a simpler form could be made to answer the purpose as well, and look better.

948. Could it be made more easily by machinery?—Yes.

949. If so, would it not be made more easily by the present makers?—I think a form could be devised that could be more easily made by hand; it could be made by machinery, but at a greater expense; when I mention this, my object is to save the Ordnance from paying more for this thing than is necessary.

950. Would it not be more easy for any man working now to make a lock, and to make it cheaper, if he made it in the form you propose?—Does the question mean, if this were altered a little, would it be more easily made by hand?

951. Yes?—I should think so.

952. You spoke the other day of an alteration in the mainspring, so as to get rid of the swivel?—I only pointed out what I thought would be an easier-made spring; I said that a swivel was more difficult to make than the roller I spoke of, and I still think it so; still I would not give my opinion upon a point of that kind; as a mechanical man, I should know that a roller would answer the purpose very well.

953. Do not you know that the roller which you propose is 50 years old?—Yes, I do not doubt that; but since I was last examined, I have seen a way of producing that swivel very readily at a very trifling cost.

954. The advantage which you contemplated in making the mainspring suitable to your machinery is now counterbalanced by some altered plan?—I have already said, and I now say, that the plans are not determined upon by which particular things will be done.

955. You gave the Committee this point as a means by which you could reduce the cost, and now you state that the plans are not determined upon; how then can your plans be correct?—I said, as to the bayonet, that there were two ways we have been thinking of, and we had not determined which was the best; and the same as to this lock; none of the machinery is ordered for this lock.

956. As I understand you, you do not mean to work upon the roller principle now?—I have no authority to speak about that, though I happened to mention it. I think the roller would make a very good thing; it would make a more easily made lock; but this (*pointing to a part of the lock*) I see a way of producing very readily, more especially the little swivel; I see a way of producing a better and a cheaper one.

957. Do you know how they are produced now?—No.

958. Are you sure that they are not produced in your own ready way now?—I do not know.

959. You talked of the guard, and you proposed that the curves of the guard should be altered?—Yes; I thought it could be done cheaper the one way than the other.

960. Your object is to make this gun to suit your machinery?—If a pattern were given to me, and it was said, "This must be done, and there must be no deviation," I would study to carry it out; but I should not be doing my duty if I did not say, "By this plan you may do it much cheaper."

961. Supposing the Ordnance insisted upon having the guard made as it is now, do you think it could not be made as cheaply as the one that you propose?—I would produce it very cheaply.

962. Then you propose to alter the guard to suit your machinery?—If that is anything, I am willing to admit it.

963. You are to be allowed to alter the gun completely from the original pattern, to make it suit the machinery, and this is all founded upon your hopes and wishes?—Nothing has been said to me about doing that; that has only been spoken about in this Committee-room. I stand by what I said on that matter.

964. As to the bayonet, you stated that it might be made at a very much reduced price?—Yes, I think the bayonet, above all things, may be. This bayonet (*pointing to the same*) is made with a socket of iron, and the neck and blade are made of steel. I am afraid that I may get too technical if I describe the

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the way in which I propose to do it; but I was in hopes that we could get the steel makers to roll a bar of steel in a particular fashion, that would just make it ready for being bent round, and worked out into a bayonet wholly of steel. I have no authority for saying this, because this is not the pattern. Here is a wrought-iron and a steel one (*pointing to the same*), and I was thinking that we could get the steelmakers to supply three-cornered steel a little larger than this, and to cut out pieces in lengths that would supply the whole of the steel for the article (*describing the same*). I have drawn up a plan of one of Ryder's forging machines, which I have submitted to a maker in Manchester, to see if he could make one in that particular shape. I was thinking, that in a particular kind of furnace, which I need not describe, a welding heat would be taken on these things, and this piece of steel so prepared should be welded on to the side by a mechanical arrangement, and as soon as that would be done I would use one of Ryder's machines to draw out this neck a little larger than it now is, and this straight out from the socket (*describing the same*); the cutter of Ryder's machine would then cut it off at an angle, and then it would be held in a pair of dies, and that angle would be knocked down to form this corner (*pointing to the same*). After this part was thus formed, heat would be taken over this piece of steel, and another of Ryder's machines would draw it out very nearly to what it now is, to about this (*describing the same*). Then I thought of taking the heat all over this part (*pointing to the same*), and by means of the American drops, first one die, and then another die, and then a third and a fourth die, just completing this, almost if not quite. I have been in communication with a person to make a machine such as I have described before, namely, with circular oscillating dies to move backward and forward, and when they opened up, the workmen would just enter the point, and let it go with it, and then bring it out again and put it into another, and another, and ultimately elongate it to an almost finished bayonet. Then comes the bending. I was thinking that they would be bent in this way; a sort of die would hold this socket, and the machine working on this as a centre, would just come round by the back of it, fold it up to the right form, and then, after they were all bent, they would be put into a series of revolving hollow spindles, and the bands of the spindles would hold them in a sort of iron chuck or hand, and they would all revolve, working together, motion being given to one of them; the drills would work all the way through, boring them out very nearly to the size; they then pass to the drilling machine so as to broach them to one pattern, and after that they would then pass, with this hole in them, into those machines for cutting out, in the way that it is done at Whitworth's and other works; a series of these would be placed in a bed, and a shaft would revolve, and this bed carrying a dozen, would pass slowly through with oil upon it; there would be another working alongside in the same way, and a man would change the one while the other was working, and these cutters would just bring them out to a perfectly straight line, and then this side (*pointing to the bayonet*) would be done in another set of machines with two sets of cutters; for turning we shall suppose there is a series of spindles just like the pipes I spoke of for drilling; these would go inside the spindles and in front; supposing the spindle to lie there, we should have a copy at each end of this projecting part of the instrument to hold the cutting tools, that at this point would move in that direction (*describing the same*), tracing a copy of the thing at each end, and while there are tools at the one side, instead of causing them to spin quickly, I would have it done very slowly, and have water upon it, so that it would go round at this rate (*describing the same*); meanwhile the fixed cutters would be turning this part, and this part would be planed out just in the ordinary fashion; I am in hopes that we could forge this corner part so nicely by preparing the dies and drops, and that just scraping a little would finish this particular part.

965. You are relying upon hope again; are you aware that what is called the round part of that bayonet is anything but round; I do not mean the socket, but that part which goes from the socket to the blade; are you aware of the peculiar form of that bayonet?—I would then straighten it, and if I found it better, I would work upon a curve.

966. You do not contemplate having it made straight to suit your machinery?—No.

967. As to the neck of that bayonet, are you aware of the peculiar form of it?—Yes.

968. Do you think that your dies would manage that?—Yes; the die would manage that very nicely.

969. Coming back to the general principle, you are decidedly of opinion, and you hope to be able to save such a large amount of manual labour that you shall be able to reduce the cost of a musket in a very large proportion?—Yes; but it would not alter my position very much if anybody could prove that we would require the double of what I have said; it would only add 4*s.* 2*d.* to the musket.

970. What do you contemplate making them for?—I have said between 20 *s.* and 30 *s.*; at the present moment we cannot speak with any confidence.

971. If you cannot speak with any confidence, and you find the price ultimately to rise to 30*s.* or 2*l.*, then that would, would it not, alter your position very much?—No; because supposing that the wages to be paid is 33,000*l.*, I think that the number I have stated is all that will be required; I fully think that 1,000 individuals will produce 500 muskets a day.

972. How many machines should you want to make this number?—A great many.

973. How many?—The precise number I cannot tell.

974. Then how can you tell what they will cost?—I have never pretended to say definitely what they will cost, but I am minutely acquainted with the price of tools in England, and I have been running over roughly, but as closely as I could; and the engineers whom I have been speaking to about the price have a difficulty in giving an estimate, so that I have only my own resources to fall back upon, and to the best of my judgment I have made out this estimate, thinking that it is a high one. I happened this morning to meet Colonel Colt, and I consulted him as to what he thought of the estimate, and it so happened that without his knowing the sum I had named, that he came very near; he said 100,000*l.* would do it out and out.

975. Did he say what he had laid out in machinery in his manufactory?—I think some one told me 50,000*l.* altogether.

976. That sum of money being applied to the making of a musket like the one before you, can you state how many muskets it would produce per annum?—The Colonel will be examined himself.

977. Taking the Colonel's establishment as it is now, with an outlay of 50,000*l.*, and applying that to the manufacture of such muskets as are now made, how many would that produce per annum?—There is more work in a revolver than in a musket; and I think the same money laid out in machinery for muskets would produce more muskets than he could produce of revolvers.

978. Are you sure of that?—It is impossible to speak with certainty; but I would think that more muskets could be produced than revolvers.

979. In making a musket you have to make the barrel?—Yes; that is one important part.

980. In making a revolver there is no barrel, comparatively, to make?—Yes; that is just the point that makes me hesitate.

981. In making a musket you want a bayonet; you want none in a revolver?—No; but the bayonet is a very trifling thing.

982. Are you competent to give anything like an approximating answer to my question?—£. 50,000 would not produce nearly the half of what 100,000*l.* would. It is a very difficult question to answer. I do not know that I can say how many 50,000*l.* would produce.

983. If you do not know how many that would produce, how do you know, with your proposed outlay, that you will produce 150,000 in a year?—£. 150,000*l.* will do an immense deal. I have no hesitation in saying that; and if at the end of the time, when we come to see what we have done, I saw the way to reduce the price of the musket, I would not hesitate to do it. The 150,000*l.* will bring them up to a certain point, and do, I think, all that we wish; but if I saw that it did not do it all, I would not hesitate to state that.

984. How do you arrive at the conclusion that 168,000*l.* laid out will produce 150,000 muskets a year?—With regard to the buildings, the steam engines, the steam boilers, and the warming apparatus, we know what the price will come to, knowing what they are now, doing the same sort of things, and reckoning it at so many machines of a certain class, and putting a certain value on them; we know the number of machines that the Americans use, and the time that each machine takes. I put a certain sum of money opposite them, and I arrived at the

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the conclusion that the stock machinery would come to somewhere about 7,000 *l.*, and I have put that down at 10,000 *l.* It is possible that I may be wrong; I do not pretend to have the second sight to see into the whole, but I would manage the first year to spend 100,000 *l.*; 50,000 *l.* on buildings, and 50,000 *l.* on machinery. I would have a portion of each, and we should see which machines were deficient in producing the quantity. Then the year after, probably, I should spend 40,000 *l.*, getting up nearly to the uniform quantity of each, so as to produce 500 of each article; then I would see where we were short, and where there were deficiencies, and alterations required; and the last 10,000 *l.* would be spent in making the thing complete, and if there was then something wanting, if I had capital, I would spend it upon making it still more perfect; if not, I would produce the musket at the old figure, and go without.

985. What time shall you require before you arrive at that point?—The Government are anxious that it should be done quickly, and I am sure that everyone will do his best to get it done; but that would be a most difficult question to answer.

986. When will you arrive at the point at which you must stop?—We shall suppose that we bring the things forward to a certain state, but there are two or three little hand operations that run away with a great deal of time. Take the hammer. Suppose the Government should not give enough for the machinery to produce this thing, just as it is (*producing the lock*), we must have to do this, in striking up this part, by hand, and some other parts, which would run into much money. If I saw the way to produce these parts by machines, would I not be doing wrong in not stating that if we spent a few thousands more, we could still further reduce the expense of a musket?

987. At what time will you arrive at the point which you have mentioned, when you will have to consider whether more money shall be laid out, or whether you shall go on as you are?—One would like to say some time or other. I should hope that we should be beginning to make muskets in a twelvemonth.

988. It has been stated that you would make 50,000 a year?—We will try very hard to do it; it is impossible to say beforehand, as to a day or even a month.

989. Or six months?—Still, if the thing is once resolved upon, we would try all our might to do it.

990. Would not every part of the musket be subject to the same difficulties, and the same additional expense, as the lock may be?—If that were so I would be wrong not to ask for it.

991. Will they not be subject to that?—I do not think that the bayonet will. I have thought more about the bayonet, because I had it earlier; I have had so many things to think about during the time that I have been considering the musket.

992. Will not you admit that the plan which you have detailed is a very intricate and complicated one?—I think not.

993. You stated just now that you thought you might want so many machines for barrels, so many machines for locks, and so many machines for stocks, like those in the American factories; did you ever see any of them?—They are not so very forward in making barrels; they are made in the way in which we do them in this country.

994. Then why do you refer to the American barrel machinery as likely to be required?—I did not refer to it; I spoke of the stock machinery, and the lock machinery, and I said that we were going to get the barrel machinery in England. I think the Americans are before us in rifling barrels.

995. Can you not give the Committee some data on which you have calculated the price that you have given?—I gave in the data the last day that I was before the Committee, and I have not got a copy of it.

996. How many muskets do you intend to make per annum when this machinery is erected, at an expense of 168,000*l.*?—We were going to have plant that will turn out 500 of everything per day.

997. That is your intention; are you confident that you are able to do that?—That is the easy part of it, because it is only having repetitions of the machines.

998. Will not that make an increase in the outlay?—Yes, but the sum that we have put down will cover that; it might not do all that I would like, but just allow

allow that it is so, it will do a very great deal; and if I found that the money would not go so far as I wished it, I would keep it back at some points that we could do by hand, and hope that some time or other money might be given to it; but I think that the estimate is so high that there is no fear.

999. Supposing this were to happen, that the gunmakers who now make the guns went to the Ordnance, and said, "Mr. Anderson has proposed to suit the gun to his machinery; if you will let us make the gun to suit the machinery, as he proposes, we will take 30*l.* per cent. off our charge;" how would that affect you?—It would not affect me materially; it would be the means of doing a great deal of good if they made as good a gun at 30*l.* per cent. off.

1000. And if they made a gun as you propose, would not that very materially reduce the boasted saving that is to take place by your plan?—There is no boasting; I feel quite the reverse of that. I think that the plant which I have proposed will make 500 muskets per day, and I think it will make them at very much less money than they cost now.

1001. Supposing that you had the means of doing it all yourself, and you were asked to contract to lay out 500,000*l.* for the purpose of making 500 muskets a day, under a forfeiture, would you do it?—I do not know that I would; but I know that if I did I would realise what we have been speaking of.

1002. There is a material distinction between the gun which you propose to make, and the present pattern which is now kept to most carefully. You must calculate that there will be a very considerable reduction in the prices if your gun is to be adopted; where will your advantage be if such a reduction takes place in the price in consequence of the alteration in the musket?—I do not enter into that subject.

1003. It was stated in the House of Commons that a better musket of precisely the same pattern would be made by the proposed plan at less than half the price which is now charged; will you do that?—I fully agree to that. I think that is the truth.

1004. You do not propose to make the same musket, do you?—I could make it if it is wanted; but by making little alterations, I say that a cheaper musket can be made.

1005. If you could do it, other people could make a cheaper musket, could they not?—I did not say that they could not.

1006. Supposing you were desired to make a rifle, in every respect the same as the pattern lately given out to the Birmingham people, to be as carefully viewed, and I may say as vexatiously viewed, could you make the proposed alterations with any reduction in the price?—I could make a very great reduction; we would do it for 30*s.*

1007. Never having made a gun in your life?—It is not necessary that I should have done.

1008. Hoping that every one of your machines when made shall answer its purpose?—If I spoke of machines on untried principles, the remarks of the Honourable Member might be good, but we are trying the principles every day on other things. There is no magic in it whatever, just having a cutter to chisel out the metal to a certain curve or pattern.

1009. How can you be sure that the application of such machines to such a purpose for the production of such a particular article, will realise the definite results which you speak of, without first having tried them?—I was called upon to give an estimate, and after thinking over it, I arrived at the conclusion which I have given; I could not do any more than that.

1010. Are you aware that the same principle has been tried in the Netherlands of manufacturing guns by machinery, and given up, because it was more expensive?—I never heard of it. A short time ago things would have been impossible that are not impossible now; so much is being done now, that I think there is nothing about this (*pointing to the lock*) that may not be done.

1011. Supposing that the proposed outlay takes place, and you are to manufacture 500 per day, or 150,000 a year, and supposing after a time the 150,000 are not wanted, that war was averted, how would your manufactory answer then, supposing you wanted only 30,000?—That would increase the price of the musket. In the first place, the coal used would be in proportion to the power required; it would be in proportion to the quantity used to drive the several bays of machinery, and we would have the shafting so arranged that portions could be detached, and the same with the men's wages, though not exactly; there

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there would be a considerable difference, we can see what it will be; the leading hands in the several branches must be kept on, but a fewer number of the unskilled would be retained, so that the wages to be paid in proportion on the 30,000 would be above what it would if the 150,000 were made.

1012. What would be the cost, supposing only 30,000 were manufactured in a year?—I should think it would add 5*s.* or 6*s.* to the musket.

1013. Assuming that there would be a great reduction in the number of guns wanted for general use, of course that would affect all other manufacturers as to the prices paid to their workmen, and their own profits; and supposing they were to reduce their prices an extra 30*l.* per cent., how would you stand then; would your gun still be so much cheaper?—I think it is impossible for anyone to make a gun cheaper than we could make it; the extra charge upon our 30,000 would not amount to what might be considered as a good profit by the makers of the other.

1014. Mr. *Geach.*] Have you paid attention at all to the progress of manufactures in this country?—I have.

1015. Are you aware that there has been a considerable transiton from hand labour to machinery?—Yes, I have been very much mixed up with it.

1016. You are aware that that has been the course which manufactures have been taking generally?—Yes.

1017. You are aware that all the trades, or a great number of them, are divided and subdivided, such as the cotton trade?—Yes.

1018. And machinery has been applied in the cotton trade to all those division and subdivisions, to a very great extent?—Yes.

1019. You are aware that in the invention of this machinery considerable attempts have been made at improvement, followed by continued failures?—Yes.

1020. Until they have arrived at the present state of proficiency?—Yes.

1021. The same has taken place in the iron trade, has it not?—Yes.

1022. And the same has taken place in almost all the large trades that are now carried on by machinery?—Yes.

1023. You stated, did you not, that you found the gun trade to be very far behind every other trade as to the application of machinery?—Yes.

1024. You have founded your expectation, have you not, of the benefit to be derived from the manufacture of arms by the Government, upon a large application of machinery, where machinery is not, so far as you know, applied at present?—Yes.

1025. You stated, did you not, that you should either invent new machines at first, the lock being composed of different parts, or adapt machines for making those different parts?—Yes.

1026. And with regard to the stock, you stated that you would either adapt or invent new machines for making the stock?—I should think for both the stock and the lock it is already done.

1027. Is the lock already made by machinery?—The machinery that is employed at Colonel Colt's factory would make the lock, with a little alteration.

1028. Do you mean to say that machinery is already invented for making a lock; do you not refer to the lock of a pistol?—Yes; but it would make any kind of lock.

1029. Not precisely that lock in your hand?—Not without alteration.

1030. Then you will adapt machinery for making that lock?—Yes.

1031. You will make the brass work, and you are either going to invent or to adopt a new process?—We shall adopt the stereotyping system of casting it, and the copying system in finishing it; that is a process which there is no doubt about.

1032. For the barrel you will adopt machinery; you stated, did you not, as to the barrel, that it was pretty nearly perfect?—The rolling of the barrel in England is very nearly perfect.

1033. Then, with regard to the bayonet, you are going to adapt or invent new machinery to a very large extent?—Yes; I do not think that it will take much machinery to do the bayonet.

1034. Then you generally expect to save a large amount of money by the adoption of machinery for making guns where it has not been applied before?—Yes; that is correct.

1035. And this machinery is to be of different kinds?—Yes.

1036. That has not been tried in this country, to your knowledge, excepting as an experiment in Colonel Colt's factory for making pistols?—I only know by hearing

hearing and reading that it is done in America; I have not seen it. Even if it had not been done, I would not have any fear about producing a machine for any particular thing.

1037. In the course of your experience, have you ever known any manufacturer engaged in a large trade, superseding hand labour by the introduction of machinery and erecting a manufactory all at once, who was successful in it?—I cannot say that I have; but we see that manufacturers do go very largely into the work, and introduce many things.

1038. Is it not the case in all mechanical inventions that one man invents one thing, and another man invents another thing, and is there any instance in this country of a universally mechanical genius who can invent a machine for everything?—No; we have not to invent them in this case, and we could get the best talent in the world to make the machines.

1039. It may be that the best talent in the world will accomplish it; there are certain things, such as the making of the smallest kind of wrought-iron nails, and machinery has never been brought to such perfection that those wrought-iron nails can be made by machinery, so as to supersede hand labour?—A gentleman who has lately been in Belgium told me that he saw a machine working, and that the wrought iron went in at one end, and the nails came out finished at the other.

1040. I am aware that wrought-iron nails are made by machinery, but hand labour is still used in making those nails against machinery, whereas in other trades, where machinery is perfect, that is not the case; and I ask you whether you believe that any man could say beforehand with certainty, that your proposed machines will do the work which you anticipate?—It would be very difficult to say that. The Honourable Member probably knows that in bringing anything to bear there are many difficulties to contend with; but for all that, I have faith that this could all be done by machinery, though there will be many difficulties and many vexing things occurring.

1041. Do you think that you have in your establishment at Woolwich, any peculiar advantages which would enable you to apply machinery better than individuals who have capital to spare, and intelligence and mechanical knowledge, could apply it elsewhere?—No, I do not say that for one moment.

1042. Do not you think, with your mechanical knowledge, that if the Board of Ordnance were induced to consent to certain alterations in the gun, and to adopt such a pattern as might be made by machinery, it is possible the gun might be greatly deteriorated thereby?—I think there are certain alterations that would not affect the gun. A very celebrated gunmaker said, that if he had a contract for a very great number, he would make them at a very small sum, compared with what they are now, and that a company would raise a quarter of a million to do it; still that was a mere saying.

1043. Mr. *Newdegate.*] You stated that the whole system of boring a gun barrel is too much a system of trial and error?—Yes, any barrel-boring that I have seen has been that.

1044. That is your general feeling as to any system of barrel-boring that you have seen; do you propose to remedy that?—I hope to do it in a better way than I have seen it.

1045. Do you know whether the inside of a barrel ought to be a cylinder or a cone?—It is generally a cylinder; I think it ought to be a cone widest next the charge.

1046. Is it ascertained in what proportion a cone will throw a projectile of a given weight best?—I do not know anything about that.

1047. If that is not an ascertained fact, must you not resort to a system of trial?—If I had a barrel to produce, I would try to get over the difficulty in some other than the present way.

1048. Has anyone ever done it hitherto?—I am not aware; I should think that some one had tried, and had done it; I do not know that they have.

1049. Do you know whether, supposing you bore, and produce ten barrels, as nearly alike as machinery will make them, the ten barrels will shoot alike?—If the barrel is straight it will shoot.

1050. Have you any experience to justify you in saying that?—I have had a good deal of experience in boring cannon.

1051. If you make 20 gun-barrels as much alike as machinery can make them, will those gun-barrels shoot alike?—I know nothing about the shooting.

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1052. Lord *Seymour.*] You stated that the economy in the manufacture would arise partly from the great number of muskets that you would make in a year?—Yes.

1053. If you reduce the number, of course the cost will have to be divided over a smaller number, and the cost will be larger?—The cost would increase as you decrease the number.

1054. Then, supposing a number has been completed for the Government, and you have then only to make a few thousands a year for the Government, would it not be for the interest of the department to supply the East India Company with muskets?—I do not know about that; I should think it would be.

1055. Are you aware whether or not the Laboratory now supplies articles to the East India Company?—Very few, I think; I think they supply them with some, but not very many.

1056. Mr. *Walpole.*] You would agree that if you had machinery for this purpose, it would be better to keep it employed than idle?—Very much so.

1057. Lord *Seymour.*] When you went through a detail of the different parts to be made by machinery, did you mean to say that they will be so exactly alike, that of the 150,000 muskets any one part from one musket, if it failed, could be replaced by another part?—That is the point that I would aim at; I think that we would come to that ultimately; but that is a very difficult point to get to; that would be the great difficulty, for that would be perfection. I think we shall come very nearly to it, but to say that we should come altogether to it, would be saying that it would be perfect.

1058. As you have read something about the American plan, are you aware whether that is actually the case?—They say that it is the case, and I have heard that it is the case; I can imagine things so perfect, and it would be perfection if they were so.

1059. As you are well acquainted with machinery generally, can you mention to the Committee any instance in which the different parts are made in such a manner as that one part could be substituted for another through a great number of similar machines?—Yes, they are making parts of steam-engines in that way for the navy, so that the sizes are definite, and so that one thing fits another.

1060. To what extent has that been carried out?—Probably your Lordship is aware, that within the last ten years an immense deal has been done which was originated by Mr. Whitworth, for the purpose of having standard sizes; an inch used to be two or three different sizes; but an inch is an inch now; and if a hole is bored out exactly an inch, and a pin turned an inch, the pin fits into the hole. I understand that where Mr. Whitworth's system is carried out, it is so.

1061. To carry out that through all the 57 parts of a gun would be still more difficult, would it not?—There are many parts of a gun that that is not required in; but I would aim to have all the parts to fit each other. That being so, the only error that would occur would be from the tools getting blunt, and not cutting out so much as when they were sharp. One great expense in conducting the place will be in keeping up the tools to the same mark.

1062. Would your system of view secure that they should be all of the same size?—Yes, I hope that we should aim at that; but it is difficult to keep the place up to the mark.

1063. You stated, that when you went through Colonel Colt's manufactory, you had hardly time to learn all that you could have learned?—Yes, at one time; but I have been since.

1064. When you go to America, what length of time do you propose to stay there, in order to learn the whole of the American system?—I was thinking, that if I could get a whole week in a single establishment, and begin at every part, and go through every portion minutely, and then go to another place, and stop a week there, and go over the same ground perhaps two or three times, I should see everything minutely before I made up my mind upon the subject; I should not do it in a superficial way.

1065. It would take you probably a month in America to study the matter?—I should think one month.

1066. Do you think that you could, after having stayed there a month, make a much more complete report and estimate upon the proposed scheme than you can now?—I should suppose that by that time we could almost tell the Committee

mittee of a great many of the contracts, if we were warranted in going into that matter; but we have no means of getting an exact estimate now without just estimating in the best way we can.

1067. Mr. *Monsell.*] With regard to a question that was asked you by the Honourable Member for Birmingham, have you any possible interest, present or remote, in getting the Government to construct this factory?—Quite the contrary.

1068. Colonel *Boldero.*] Which is the best finished weapon, Colonel Colt's ordinary pistol, or one of your new rifled guns?—I think that some of the guns which I have examined are just as well done as a gun could be done; and some of Colonel Colt's pistols that I have been examining, too, are just as well done as it is posible to do them.

1069. Take the lower-priced pistol of Colonel Colt's, the one at 6 *l.* 10 *s.*, is not that an inferior weapon to the musket which you supply now to the army?—I could not say that.

1070. Mr. *Walpole.*] As I understand you, you cannot give this Committee, nor furnish the Government, with an accurate estimate of the probable cost which would be incurred by the Government in establishing this new system of making small arms?—No.

1071. But you are clearly of opinion that you could give such an accurate estimate if you proceeded to America, and had a month's opportunity of examining the different establishments there?—I could get a very great deal closer to it then; not perhaps to the full extent, but very much closer.

1072. In all probability you could then furnish such an estimate to this Committee, that the Government could act upon it with a very close approximation to what would probably be the result?—By that time it is probable that we would have an estimate upon some contracts to supply some of the machines, which we have not at the present time.

1073. Do you think that there is anybody in any Government department, who can give the Committee such an accurate estimate as would be obtained after you had inspected the establishments in America?—I do not suppose that there is one in England.

1074. The result appears to be this; that in prosecuting the present inquiry we should not be able to obtain an accurate estimate as to the probable cost to the Government in establishing this new system?—No.

1075. Mr. *Muntz.*] You were asked whether the work in Colonel Colt's pistol was equal to the work in the Minié rifle now ordered and approved by the Government, and you stated that you thought they were equally good. Do you mean to say that they are equally as good for their use, or equally as good in every respect?—I have not examined them so minutely as to say that.

[*The following Papers were delivered in:*]

ACCOUNT of the Sum voted for the Supply and Repair of Small Arms, in each Year from 1842-43 to 1844-45, and the Sum actually expended.

Year.	Amount Voted.			Amount Expended.		
	£.	*s.*	*d.*	£.	*s.*	*d.*
1842-43	180,000	–	–	114,660	15	6
1843-44	136,000	–	–	118,936	19	7
1844-45	90,000	–	–	111,336	11	9
1845-46	84,379	–	–	117,317	13	8
1846-47	120,000	–	–	135,377	7	6
1847-48	120,000	–	–	134,769	2	10
1848-49	140,000	–	–	139,365	8	–
1849-50	120,000	–	–	122,885	15	–
1850-51	90,000	–	–	88,979	12	4
1851-52	76,000	–	–	37,664	–	8
1852-53	78,000	–	–	61,639	18	10
1853-54	135,800	–	–	*26,931	4	–
1854-55	161,400	–	–	—		

* As far as can be ascertained at present.

Ordnance Office,
15 March 1854.

J. Wood,
Secretary.

Mr. *J. Anderson.*

15 March 1854.

PROBABLE ESTIMATE of the COST of BUILDINGS, MACHINERY, &c., for the proposed Small Arm Manufactory.

	£.
Foundation, buildings, and brickwork of furnaces	50,000
Two condensing steam engines, &c.	4,500
Steam boilers, &c.	2,700
Mill gearing and shafting	2,500
Warming apparatus	500
Rolling mills, &c.	1,860
Iron work of furnaces	720
High-pressure steam engine, stack boilers, pumping engines, &c.	9,168
Straightening presses	100
Forging machines	1,050
American drops	1,200
Smiths' forges and tools	675
Oscillating bayonet machine	300
Barrel-finishing machinery	20,000
Lock ditto ditto	15,000
Stock ditto ditto	10,000
Bayonet ditto ditto	8,000
Guard, heel-plate, nose-cap, side-cups, &c.	2,690
Breech-pin, nipple, sight, bands, &c.	2,000
Ramrod, stopper, &c.	1,320
Small screw machinery	3,000
Polishing machinery	1,200
Lathes, planing, and other machines	3,000
Small tools of various sorts	2,000
Incidentals	6,517
£.	150,000

Jovis, 16° *die Martii*, 1854.

MEMBERS PRESENT.

Sir W. Molesworth.	Lord Seymour.
Mr. Monsell.	Colonel Dunne.
Mr. Muntz.	Mr. George Dundas.
Colonel Maule.	Colonel Boldero.
Mr. Newdegate.	Lord Paget.
Mr. Geach.	Colonel Lindsay.
Mr. Walpole.	

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Lieutenant-Colonel *Sam Colt*, State of Connecticut, U. S. America, called in; and Examined.

Lieut.-Colonel *Sam Colt.*

16 March 1854.

1076. *Chairman.*] YOU have a manufactory of pistols in this country, have you not?—Yes, at Thames-bank, near Vauxhall-bridge.

1077. Are your pistols made by machinery?—They are.

1078. When did you establish your manufactory?—I opened my books on the 1st of January 1853.

1079. How many persons do you employ in your manufactory?—I cannot exactly say; but between 200 and 300.

1080. You have likewise a manufactory in the United States, have you not?—I have.

1081. How many persons do you employ there?—Generally about 500.

1082. How many pistols do you estimate that you can produce in your manufactory in the United States?—In the United States, with 500 hands, I can produce between 1,500 and 2,000 a week.

1083. And with the number of hands that you employ in this country, how many

many can you produce?—I think if I were to *confine* myself to one particular style of arm, and work from one model, I could produce 1,000 a week.

1084. Do you make your pistols chiefly by machinery?—Entirely, except taking the burr off and passing the parts from one machine to another, finishing and assembling the work.

1085. Do you consider that you make your pistols better by machinery than you could by hand labour?—Most certainly.

1086. And cheaper also?—Much cheaper.

1087. Are you familiar with the manufacture of muskets by machinery in America?—I am.

1088. Do you consider that the muskets manufactured by machinery in America are as well fabricated as the Minié rifle which has been submitted to you?—There is none so badly made at *our* national armouries as the Minié rifle shown to me; that arm would not pass one of our inspectors.

1089. Do you consider that the muskets fabricated by machinery in America are much superior to the Minié rifle shown to you?—Most certainly, I do.

1090. Have you written to the Ordnance to consent, on certain terms, to supply muskets to the Ordnance?—I have written to the Ordnance my opinion of what the arms could be made for in England, but not with a view of taking a contract from that department, but to give my impression of what the arms could be made for *in this country*. I have endorsed that opinion by the statement that I would supply the arms at those prices.

1091. Have you a copy of that letter?—Yes; this is the letter which I wrote to them (*handing in the same*).

1092. I will read this extract from your letter of the 13th of March. "So confident am I that this system of manufacturing fire-arms is correct, and the only one by which arms can be made the one like the other, with economy, that I am free to say, what I have before verbally stated, that with 100,000*l.* expended in machinery, tools, &c., 1,000,000 of rifled muskets can be produced at an expense of 30*s.* each; and that while they will possess the advantage of uniformity of parts, none that are so made will be inferior to the best that can now be found in Her Majesty's service for military purposes. I do not want to make a proposition or a contract for the construction of a million of arms *that are not of my own peculiar principle*, while you have men of ability who, I believe, are fully competent to produce the results I name, yet I am confident that I can produce the one million of arms, if you desire me to do so, at the prices above named, 30*s.*; and I would endeavour to do all the work in this country, unless I should be interrupted by combinations of operatives claiming from me more than the present price of manual labour." ?—That is all that could be said if I were to talk for a week; that is based on my estimates of what can be done; but if I had to do the work under restrictions that I do not now suffer, it could not be done, or it might not, because people might call upon me for extra service, extra pay, or extra something. If you can ensure me the price of labour that I now pay, that result can be produced for that amount of money, with such an amount of outlay.

1093. How long do you estimate it would take you to produce 1,000,000 of muskets?—A good while to start; I should think 1,000,000 of muskets could be produced with the amount of capital that would be asked for, say 100,000*l.* sterling, in 10 years' time. I am paying now more for labour than I did some time ago; in fact, labour has *gone up* here lately, and is nearly the same price both in England and in America; but at the present price of labour I would at once guarantee to produce those arms for the price in 10 years.

1094. How soon could you produce the first 100,000?—I think within the first two years; that would be the hasty part of it.

1095. Does that mean from the moment the order is given, or from the moment when the factory begins to work?—I should think I could produce 100,000 a year, after the whole factory began to work. I am of opinion that it would take a long time to start one here.

1096. How long would it take to start?—If I took my own regular machinery that I have here, as a beginning, and if *I* made the arm, it would take me half the time, than if I had to go into the market to get machinery, or make it myself. If I had to go to the market for machinery, it must depend entirely upon whether I could succeed; I would get enough machinery together in a

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year to commence with, and in less than two years I would turn out 100,000 a year.

1097. It would take three years from the time the order was given to make 100,000?—No; the first year I would do all the getting together of the machinery; I would not guarantee to supply arms the first year, but from the beginning of the second year I could supply 100,000 a year, and continue them for the period of 10 years at that rate. If you gave me 100,000 *l.* capital, I would go to where I knew the machinery was to be obtained.

1098. You would require a capital of 100,000 *l.*?—Yes, for machinery alone. I think it could be collected together in one year to produce 100,000 a year. The first year's work might cost more than the estimate, but the second year would not exceed the estimate, and so on, down to the tenth year; the tenth year's arms would not cost nearly as much as the first year's.

1099. Have you considered Mr. Anderson's estimate for a Government manufactory?—Yes; yesterday he gave me a little memorandum, and I looked it over generally, I could not go into detail.

1100. Do you think that that estimate would be sufficient for an establishment similar to that which Mr. Anderson has proposed?—It would be ample for me at home. He is a better judge of what things would cost here than I am. In America that amount of money would produce the results that I have stated.

1101. Is not production more expensive in America than it is in this country?—Labour is more expensive, but machinery is cheaper.

1102. Lord *Seymour.*] When did you first commence manufacturing small arms by machinery in America?—I commenced many years ago; I commenced in 1836, I think, first to make arms by machinery.

1103. Since 1836, have you made any great improvements in the machinery? Yes; I have made a great many improvements in the machinery, and every day adds an improvement now.

1104. When you commenced at first to make arms, was it for the purpose of making arms for the Government of America, or for general sale?—For both. At first I intended it for private purposes, but with the hope of supplying Government, as all new mechanics think that Government patronage is valuable to them; it is an advertisement, if nothing else.

1105. Would the same machinery that answered for the guns made for private purposes answer also for the musket required by the Government of America?—Certainly, it would.

1106. The same machines will make, to a great extent, rifles or fowling pieces, or pistols?—To a certain extent. Most machinery is competent to many changes, so as to be made applicable to a pistol, to a rifle, to a musket, to a carbine, and to any other arm that you choose to apply it to. You only multiply the simpler engines where you have much to do, otherwise one universal machine would do all that you have to do. If I had 100 arms to make a year, I should want only three or four machines; but if I had many hundred thousand arms to make, I must have many hundred machines, and then I would make each machine more stubborn and firm to do this particular work, and in proportion as it related to the quantity to be made.

1107. Could you state what has been the largest number of arms that you ever made in a year in America by machinery?—About 50,000. But we have simplified and improved our machinery, and there is more capital in machinery now than there was then.

1108. Was it at one establishment that you made that 50,000?—Yes, at Hartford, last year.

1109. When you say 50,000, does that include different kinds of arms?—Yes; it includes the arms I make; they are of five different sizes, in pistols alone.

1110. They are all repeating?—Yes; a repeating arm is more difficult to make than a single bored arm.

1111. It includes revolving guns and revolving pistols?—Revolving pistols. I have not made a revolving gun, except models, during last year; I am now beginning to make them again. Last year I made only revolving pistols, and this year I shall make, probably, 70,000 revolving pistols, and some rifles besides.

1112. You stated that you could make at the rate of 100,000 muskets a year; but you added, if no restrictions were put upon you?—No more than I have now.

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1113. Do you mean that the arms when made are not to be subject to any view?—I mean this: give me 10 arms, the best you can pick out, to be models; pick me 10 of the best Minié rifles (do not have them made on purpose): then pick out the best one, and I will more nearly resemble the best one with my 100,000 a year than the other nine will resemble one another.

1114. You have stated that the best is very bad, and you have offered to make the arm of the Ordnance, but you say that the arm of the Ordnance is so badly made that it would not pass view in America?—Yes; our American inspectors are more strict than what I have yet seen in England; the arms must be more uniform. I do not say that we can make a single arm so well, or any better, but I say unqualifiedly this: give 100 arms to an American inspector, made at any place you choose by contract in England, and more would be condemned out of them, even if made expressly, than if you took the arms made by machinery, which shall be uniform in construction; you give to a man a model, and he will make them all alike; I can make a bad arm, and make bad arms all alike.

1115. Are the Committee to understand that the fault which you find with the Ordnance is, that one arm is not like the other?—That is the very thing I find fault with in the arms I have seen here; there is more difference between one and another where they are made by hand, than there can possibly be when they are made by machinery. A machine tells better for uniformity than hand labour does; the eye cannot control the hand sufficiently to imitate a machine; it is the uniformity of the work that is wanted. If you give a model, even though a bad one, and if you instruct your operatives to attend the machine to make them like the model, they are all made bad; but if the model is right the operative cannot change his machine, or get it out of place, and that is the effect of machinery on arms, or any other branch of mechanical industry.

1116. When you made those 50,000 in a year, could any one part of one gun, for instance, be adapted to another gun; were they so accurately made that you might assemble the parts together, the locks and other parts, indiscriminately?—I should say that they would do that a great deal better than any arms made by hand. At the price named for the arm, 30*s.* for 1,000,000 of arms, they would interchange one with another more completely. But as to the price named for the arm, I would not care whether it cost 3*l.* or 5*l.*, if made otherwise; in the same number of arms placed before you, the 5*l.* would not equal what the 30*s.* would produce. It sometimes happens, in hardening a piece of metal, that it will change its position, and it requires the delicacy of touch of a polishing machine. If you break 100 machine arms, the barrel of one, the cylinder of another, the main spring of another, &c. &c., break each in its opposite parts, till you break the whole, say some 20 parts, you will then have lost one arm; but you will get of the 19 probably 18 arms that will interchange. I do not think I could now do it exactly to that extent. Sometimes there would be a little spring of the frame in hardening, a little one way sometimes, and sometimes a little the other; but each being made alike, why should they not come together?

1117. As you consider the Ordnance arms to be badly made, do you think the barrel badly made?—I say it is simply bad for uniformity's sake. I say that you do not make any arms to interchange.

1118. The fault you find with the arm is, in short, a want of uniformity of construction?—Yes.

1119. That you consider, for a military arm, to be a great fault?—I think it is essential for military arms to be capable of interchanging.

1120. With respect to the arms made in America, is it a fact that that interchange of parts is possible?—Yes; it is so near that it would not cost you very much to interchange them. There might be a spring in any of the pieces of metal hardened, which might vary them a trifle, but not more so than if made by hand. Those made by hand have the awkwardness of hand labour as well as the spring.

1121. Do you know, practically, whether in the arms made in America there has been this interchange?—Yes, many thousands; it is the constant habit of Government officers who use my arms in Oregon, or in California, to order 100 mainsprings, or 1,000 mainsprings, or 1,000 hammers, or 1,000 triggers, or 1,000 of anything else applicable to the most perishable parts of the arm, and I send them; and one of the commonest operatives or soldiers will take an ordinary tool, and put them in the place to which they belong. If the hammer is broken, he

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he will put in a new one, and so on. Usually it is the custom in our country, where we send out a large number of arms, suppose 1,000, to California or Oregon for military purposes, to put those parts to which accidents are most likely to occur, in the arm-chests. A spring cannot always be relied on so much as a barrel, and we put enough in for immediate repair; and if there is a bad piece of metal thrown in, we supply it. Everything goes under a particular form of gauge and proof, and an arm is repairable just as well in California as in New York. These remarks are applicable to the national musket, as well as to my own individual arms.

1122. You have stated when you began your own manufacture in America; could you state when the Government undertook the manufacture of arms in America?—I cannot tell the particular period.

1123. Was it before you commenced?—Yes, they began the manufacture before I was born, I believe, a long time; and they adopted from that time to the present the best system that they could, to make the work uniform.

1124. Their adoption of the manufacture of arms did not arise from the adaptation of machinery to that purpose, but it was before this new machinery was introduced?—They began by getting the best tools they could to start with, and continually improving upon them; for instance, improvements in stocking arose from a man who had nothing in the world to do but to attend a common engine-turning lathe; he was turning gun barrels, and as he came across that part of the barrel projecting for the pan, there was a part that he could not then turn by machinery. Mr. Blanchard said that he could, and being encouraged did, get an undulating motion in his lathe, and turn that part. That introduced a piece of machinery, and its principle ran through the whole of the Springfield Armoury till they finally produced not only that part better, but they went on till they produced an entire *gun stock* by machinery. Now it costs less for a stock than it does here for the wood. At that armoury this gun stocking machinery has run on beyond any other branch in every department. That illustrates how far you can go; a man with any quantity of money can do anything by machinery.

1125. Do the Government in America not only manufacture arms themselves, but purchase from you and from other manufacturers?—Yes.

1126. Then they do not manufacture enough for their own supply?—No.

1127. What quantity a year do they manufacture?—I think they are now making about 50,000 a year of small arms at the two national armouries of Springfield and Harper's Ferry.

1128. What does the supply for the army amount to annually?—Those arms made at the National Government Works are mostly stored for the use of the Federal army; about 12,000 or 15,000 men at the outside.

1129. For 12,000 or 15,000 men, do they require 50,000 a year of their own manufacture?—No. We have, besides these, the militia, 2,284,732 enrolled.

1130. Does the Federal Government supply the militia?—Yes, mostly.

1131. What is the price given for a musket for the army in America?—Does the question mean exactly what it costs if made at the national armoury?

1132. If they purchase it, what price do they pay?—That depends a little on the market, and just now it would be more than at another time lately.

1133. What do they give at the time?—The latest contract price would vary between 10 and 12 dollars, where a man finds his own capital.

1134. Is that about 2*l.* 10*s.*?—Yes, including his own stock, and his own brains; the arms produced have to pass the same inspection as at the national armoury; in round numbers it would be about 2*l.* 10*s.*

1135. Would the musket given to a militia man be as good a weapon as that on the table?—Yes, it has to pass the same inspection, but it would be made by private individuals for the militia usually. There are many private manufacturers besides myself in America who contract with the Government to make arms; some have an order for 20,000 or 30,000 at a time; others, for 10,000; others, for 5,000; and those men make the arms that usually go to the uniform companies of militia of a particular State. One firm in Windsor, Vermont, makes arms for the Government, another in Massachusetts, another in Connecticut, and other States, and these arms have to pass the same Government inspection, but they are usually employed for the militia. Every militia company that is called out is armed in the State to which it belongs; one State does not get its arms from the National Government in time of peace, except

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in a quantity in proportion to its militia enrolment per year; some States have a fancy for artillery, others for infantry, and others for cavalry. Sometimes they take the cavalry and other equipments from the National Government, as well as arms.

1136. Is every State for its militia obliged to take the same pattern of weapon, or is the musket that is made for the army in America exactly of the same pattern as that used by the militia through the different States?—Of course it is, when upon the service of the Federal Government; they have them all uniform, and they will not issue that which is not uniform. For example, before my arm was admitted into any State service, it went through the ordeal of a Government Board of Ordnance at Washington; a repeating arm was a novelty, and when that Board of Ordnance finally reported favourably to that arm, the Congress of the United States made the necessary appropriations, and this arm was then adopted as one of the established arms of our Government, and now Government contracts with me for the arms they require of my construction; and then when a State comes with its quota for so many muskets, so many Colt's pistols, so many carbines, and so many horse equipages, I take my share, that is, as they come. Still, a State has a right to contract for any amount of arms, but what they get from the Government comes direct from the national stores.

1137. Am I right in concluding, that though the Government of America manufacture themselves a large amount of muskets, they yet find it good economy also to purchase of private manufacturers?—It may be more policy than economy.

1138. Will you explain what you mean by "more policy than economy;" is it good policy to maintain the manufacture in the country?—Yes, it is good policy to maintain a model shop in the country, if nothing more.

1139. And it is worth while even for the Government of America to make some sacrifice in point of cheapness, in order to keep up the manufacture in the country?—I think it is good policy of any person who has to negotiate with another, always to hold within himself the power to produce that which he requires of another, and it is the same in the case of the Government of America as in the private transactions of life; they can produce at the national armouries double what they now do; they do not do so; they wish to encourage the artisans of the country, and are willing to employ them. Suppose Government makes half, and contractors the other half, the result is the same; there is the same inspection; but for the Government to take the arms harem scarem, they would not get the arms they wish for. Individuals sometimes, if there is more industry employed, and more economy employed in labour, may be able to make a little more profit out of it than the Government does, but that is the only way; it depends upon the ability, the machinery, the capital employed, and the intentions, as to who wins: Government, who represents the interests of the whole people, or the individual contractors.

1140. Does the Government in America manufacture for itself many other articles besides arms?—They manufacture small arms; they manufacture cannon, and they manufacture all things connected with small arms, more or less; some things they contract for.

1141. Do they manufacure steam engines for their navy?—When they build a ship they are very apt to have their own agents superintending the manufacture of the steam engine; they have not steam engine manufactories to do all their work; they have no large works expressly for the manufacture of steam engines, yet they have general machine shops in their navy yards and arsenals; so that if they want to have any part of an engine restored, or a new one made, they could do it; and they hold themselves always in readiness to do that which contractors will not do on reasonable terms.

1142. Having this machinery, as I understand from you, they go generally to market to purchase under inspection?—No; they make generally as much as they conveniently can themselves, but when they want extra things they go to market for them.

1143. What do they make themselves generally?—They make a little of everything; more of some things than others; they would not allow anybody to make anything of importance in great quantities till they had made it first themselves, and then they would keep a model, in order that those ordered should agree with it; that should correspond, not only with the original, but with what

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they have on hand, to prevent any alteration being made, no matter what it was; if it were a steamboat, they would keep a model and drawings of it.

1144. They make two, one being for a model to measure the other by?—In anything they do, they would have at least the diagrams that were requisite for their own security.

1145. You have visited some of the manufactories of small arms in Europe, have you not?—Yes, I have seen some of them, not all; they do not always admit strangers.

1146. Have you visited the manufactories at Liege?—Yes.

1147. Are they very inferior?—I have not seen there a manufactory that I consider any more than a gunsmith's shop. Many may have an assembling room to put together 100 arms a day, but that is not a manufactory. Those who make arms at Liege make them all over creation, and the dealers have an assembling room.

1148. You think that the plan of making them in separate pieces, over different part of the town, is a very bad plan?—I certainly do; I would rather have them made and assembled together in one place, unless they had machines to make the different bits of the work correspond to gauges; then I do not care whether you put a machine in a garret or a cellar, it makes no difference. If a man works up to a machine according to a gauge, it makes no difference. If I wanted to manage 1,000 men, as a matter of economy I would have them all under one roof.

1149. In America, wherever small arms are manufactured, are they always made under one great establishment?—Not always, but most generally; almost universally. I do not know a single manufacturer, however small he is., who does not do so. He may buy the barrel out, but he will make his own stock, his own lock, and put the parts together, and assemble them; he does not grow the wood to make the stock, but he gets the stock to suit him as near as possible first.

1150. For the manufacture of muskets you stated, did you not, that the machinery you have now would be of great assistance towards making the number that you wanted to commence the manufacture with?—The machinery that I have in England would be of great assistance in starting the fabrication of muskets, but it would be no better than others that could be produced by and by, but it takes time to produce it; it would be an assistance in the beginning. In making the proposition, and saying that I would guarantee to do those things upon my estimate, I said that I would do it myself if necessary. I should at once calculate to convert my machinery immediately into the first beginning of this kind of work. If I had a contract to make 100,000 arms, or 1,000,000, I would not only convert this machinery into immediate action, but I would not even wait for buildings, I would have the drop hammers going on in forging as soon as the dies could be made, to get out the greatest number in the shortest time. In the first few thousands possibly there might be defects, but if it were done in a hurry you must expect that.

1151. When you first set up your factory here, did you send for machinery from America?—No, I first began to buy it here, but it would not do, and I sent to America for it; it was not made for small work. You make a very nice large machine here, but when you come to little details for making fire-arms, I do not know a man competent to do it. Mr. Whitworth comes nearest of those I have met, but he has not made me a good machine yet, nor a perfect machine for my business; he does not make gun machinery, he has not begun to make it. He is, I presume, competent to do it, or any thorough workman, but he has not done it with perfection enough to make guns to interchange.

1152. Had you much trouble with your men here at first?—I had a good deal of trouble to start with. I found great difficulty in this: I brought over first some Americans here, to lead off as my master workmen, but the climate and the habits of the people did not agree with them; they led the jobs. I began here then by employing the highest-priced men that I could find to do different things, but I had to remove the whole of those high-priced men. Then I tried the cheapest I could find, and the more ignorant a man was the more brains he had for my purpose; and the result was this: I have men now in my employ that I started with at 2 *s.* a day, and in one short year's time I cannot spare them for 8 *s.* a day; I pay some few of them that, and I would not let them go just now if they required 9 *s.* That is the result of employing your men

men of ignorance. They first come as labourers at 2*s*. a day, and if I find them expert and honest I employ them as watchmen, or to weigh metal. In a little time if there be a machine vacant, I put them on it. They would improve from 2*s*. in the first few months up to 4*s*. or 5*s*., and by and by they become masters. One half of my masters are Englishmen now, and they fill the vacancies of the Americans who become dissatisfied, from ill-health and from other causes, and go home. The best get 8*s*. a day, and at last they become masters too. Do not bring me a man that knows anything, if you want me to teach him anything.

1153. Mr. *Walpole*.] You want good brains, and little knowledge?—Yes, I take the raw material.

1154. Mr. *Newdegate*.] Do you mean that you can get more undivided attention from such men?—Yes, the more lessons you can teach them. Take a man here that has been in the habit of rifling a barrel, and he will not do it in any other way than he has been used to do it; but take the raw material, and bring him up to the work (and you have millions of it here), promote the man, and put him in the line of promotion, and he will produce the result you want, and he is elevated.

1155. Mr. *Muntz*.] Do you find that the men you describe do learn to do this sort of work so readily and so well?—Yes; they do not learn anything but what I teach them, and are willing to learn when kindly treated.

1156. Suppose you take 10 of those men, and put them to work at what you cannot call otherwise than skilled labour, what proportion of those 10 do you find to realise your expectations?—Nine out of 10 become skilful, and some masters.

1157. Lord *Seymour*.] I understood from Mr. Anderson that he visited your manufactory, and was very much pleased with it?—Mr. Anderson has been there three or four times. I invite all the Committee to come and see the tools, those that do not like it and those that do, that they may see whether the plan be a good or bad one.

1158. Have you ever visited the Ordnance establishments at Woolwich?—Yes, I have been over them, but not with a view to criticism. *I really think that the Committee are going into questions that do not belong to me to answer.* I do not want to criticise everything.

1159. Mr. *G. Dundas*.] What was there that struck you in the Ordnance rifle that was exhibited to you lately that appeared difficult to make in exact duplicate; for it was not by comparison as to the want of uniformity that you formed your opinion, one rifle only having been shown you?—I have seen many of them.

1160. You stated, did you not, that one only was shown you, and you said with regard to that rifle that there was an apparent difficulty in making a counterpart?—I think that the awkwardest part of that (*pointing to the rifle on the table*) rifle is the hammer, it is crooked; that is not plain sailing. To make these unnatural ovals would require an extraordinary effort of mind in producing machinery to do it. The machinery would be complicated, expensive and unnecessary, and you can get the same strength, the same useful results, and an equally handsome article, with one quarter the expense of making it. There is not a single direct line on that hammer, and they are skilful artisans who do the filing to bring it round to that snail-like form.

1161. Mr. *Muntz*.] Supposing that gun was to be the only gun made, and you were called upon to make other guns precisely like that, what difference would there be between the cost of that gun and the gun that you propose to make?—It would be considerable; I should propose to make some alteration.

1162. The Ordnance will have it precisely as it is. Will you tell me what would be the difference of cost between making that gun as it is without variation, and the gun that you propose to make?—That is almost impossible to tell; you could only tell that after a year's experience.

1163. Can you give the Committee the approximate difference?—I would simplify the gun very much; I would not have these different curves (*pointing to the gun*); I would make one curve to go all round there, that would be one cut; the difference between this particular oval, and that oval, and that, and that (*describing the same*) requires this motion, and that motion (*describing the same*); five motions. These detailed forms are not necessary, and it might be made suitable to the application of machinery by the one simple operation, and yet be made handsome; to get out the inside of the guard would be another motion, and

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and the man that files it has to file it all over; I think that a drunken man must have made *that* gun.

1164. *Chairman.*] With these alterations, would the musket be as useful?—Yes, and cheaper.

1165. Colonel *Boldero.*] Are the American muskets made upon the plan on which you now propose to make the Government one?—Yes, entirely.

1166. Have you one in your factory?—Not a musket; but in my own arms one part corresponds with another very nearly, but I am labouring in this country under great difficulties, therefore they are not so uniform here as they are at home.

1167. Your pistols are not made altogether by machinery; will you state what proportion the manual labour bears to the machinery in the cost of them?—The machines of the manufactory that I have here, I think, save me more than one-half of the entire cost of the arm. I would say that it enables me to produce almost three times as many arms for the same money.

1168. Mr. *Muntz.*] Is that allowing anything for the first cost of the machinery?—I take that into the general expense. I take it in round numbers. I would say that the materials are about 30 per cent., the machinery 50 or 60 per cent. of absolute saving, and the balance would be in the general expense account, and the labour of assembling. The hand labour is not 20 per cent. of the whole cost of the arm, including the moving of the metal from one machine to another.

1169. But work is done in your manufactory now, save and except machine work, is there not?—Yes, there are people here that will give an extra 1 *l.* for engraving a single pistol. They pay often more for pretty than for useful articles.

1170. Mr. *Geach.*] You have a patent for your pistol; it was taken out in 1836, was it not?—Yes; and several for improvements since.

1171. You were induced to open your establishment for the purpose of carrying the work to perfection, and getting the largest amount of profit that you could out of it?—Yes; and I am now proud of the results of my exertions, and can paddle my own canoe.

1172. It was not, I think, until 1850 that you were enabled to derive the full benefit of the patent?—I was not successful here at all; I had to devote all my energies at home.

1173. I am speaking of America now: until 1849 or 1850, even in America, you were not successful, and you made no profit?—It was not profitable; I did not make any money till lately; I made none in America until my arms were employed in the service by the energy of the people who went first to Florida, next to Texas, in the wars against the Indians, and finally to Mexico, in our war with that country; that completed the reputation of my arm, so far as America is concerned. After the Mexican war commenced, its peculiarities being known, the arm, which I was selling to the Government at 25 dollars a piece, was sold by individuals and soldiers as high as 200 dollars to traders; and such was the desire to get those arms, that officers sometimes bought from the traders at those large prices for their own private use, without a knowledge where those arms came from.

1174. Do you mean your pistol?—Yes; my pistols were sold usually for from about 75 to 150 dollars, and sometimes 200 dollars each; and the tradesmen resold them to our own officers, when the Government paid me only 25 dollars.

1175. In 1847 you had a contract with the Government, had you not?—Yes; immediately after the war commenced, then the Government came to me for the arms. The other arms which I made originally got into the service; and when I recommenced my manufacture I advertised in the newspapers for a specimen of my own arm, as I had given my samples and models all away to friends; but I did not find one at the time; and in getting up the new ones I made improvements on the old.

1176. In 1847 you took a contract for 1,000 of those pistols from the Government?—Yes.

1177. For 24,000 dollars?—Twenty-eight thousand the first contract, and 25,000 afterwards; the last price was 24 dollars each.

1178. Those 1,000 you stated, did you not, cost you 27,000 dollars to make?—I lost by the first thousand; and the reason was that I had to get machines to make the arms even passable, and I ran my machinery night and day.

1179. You

1179. You found that it was some time before you got your machinery to that perfection to which you have raised it now?—Yes, it was; I not only improved upon the machinery, but in the model of the arm itself; the same arm for which I contracted, and the result was much better for both the Government and myself.

1180. Have you not found in your experience of machinery, that upon the introduction of any new manufacture, or in the adaptation of machinery to any new manufacture, there is always a great deal of difficulty to be overcome and surmounted?—Yes, of course there is.

1181. Did you overcome any of your difficulties by a reference to what the Government in America was doing, or by copying any of the Government machines?—I had them to start with, and I overcame my difficulties by creating a change to overcome the difficulty in my own establishment; I changed and made machines to suit my own case.

1182. You invented or adapted machines for the purpose?—Yes.

1183. You expended very large sums, did you not, in doing that before you arrived at the perfection which you have now?—Yes, considerable sums.

1184. In fact, some of the machinery that you had was cast aside altogether?—Very often; as you say, I got 28,000 dollars for the first 1,000 arms; they cost me about what it came to, a little more or less, and much of that cost entered into the making of the odd tools, and the rejection of the poor and the taking of the good. Now I can make those 1,000 arms at a very much cheaper rate; that is the result of machinery, and I have paid for the machinery out of the profits of the business.

1185. There is no doubt that it has effected much after a long time; when you bring it to perfection it becomes profitable, but in the meantime you have a great deal of difficulty to contend with, and it is not always when you conceive that a machine will do the work that it turns out as you expect?—No; but if you have a good conception, you pretty soon bring it out, keeping a man at work on a single idea, sooner or later; the steam engine was not made perfect by the first man who conceived it.

1186. You have been very successful in making pistols; was not the great stimulus to your exertion the certainty that the profit would come into your own pocket?—I think so.

1187. Do you believe that if you had been employed by the American Government to do the work, you would have proceeded with the same energy to overcome the difficulties?—I certainly should if I were a Government officer, and agreed to do so.

1188. When you had expended, say 150,000 dollars, and they had been lost, and the American Government would have given you no more, you would have failed, would you not?—No, not if I said that I would do it; I would have done it; if they take me into their firms, they endorse my ability and furnish me with their money.

1189. Supposing that instead of private individuals furnishing the money you had been supplied with the 150,000 dollars that you lost in the first instance by the Government, and they had refused to give any more money, that would have been a failure, would it not?—Yes, it was a failure anyhow; I had to pay 30,000 dollars out of my own pocket for this failure of private enterprise in making my arms; it is not very creditable to me to have my arms fail under any circumstances, but they did fail; the facts are known to everybody; I have gone to work individually, and I have succeeded by my individual energy and the circumstances of the times.

1190. Colonel *Boldero.*] In the calculation which you have made of 50 *s.* a musket, do you include the value of the stock, or is the Government to find the stock?—All I include is, the model and the order; I do everything else myself; I find entirely everything and stand your proof; give me a gun, and if you can burst one of mine by your service or proof charge, and I cannot burst yours, mine is a failure.

1191. If the Government advanced you 100,000 *l.* for machinery, at the end of the first two years you would undertake to make about 100,000 muskets?—Yes.

1192. That would bring the value of those muskets to 3 *l.* 10 *s.*, would it not?—No; I could produce 100,000 muskets, upon the advance of money to be expended in machinery and tools; I would get the machines just as quickly as they could be got together, and then I would begin to produce; I think that in the

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the first year there would be but little show of arms completed, but after that first year, and being ready, I could produce 100,000 muskets; but suppose I produced only 50,000, I could hasten the next year's work to produce 150,000 to bring it even, and in 10 years 1,000,000 could be produced, and at the end of 10 years, I believe that the absolute cost of making them would be below what I say.

1193. Mr. *Muntz.*] You do not mean that musket which is before you?—Yes; give me that model and I could do it.

1194. You stated, did you not, that you must alter it?—One million like that musket can be produced for 30 *s.*; I would not make it as you do exactly, but I would make it the same in substance and in detail to the full extent required by the Ordnance.

1195. Colonel *Boldero.*] How long is it since the Government of America have made muskets by machinery?—I cannot tell when they first commenced appropriating money, or when they first began making them by contract; I cannot tell when the foundation of the Springfield Armoury was laid.

1196. How long ago, do you suppose?—Probably before I was born; it may be 40 or more years ago since they started.

1197. Are you aware of the mode in which the great continental powers make muskets?—Pretty nearly.

1198. Is that upon the Springfield principle?—No; they make them mostly by hand, and assemble them in an assembling-room.

1199. Can you give any reason why those great military powers have not made muskets in the cheapest way that they could, if your plan is a good one?—I see no reason, except that they want to employ their unoccupied people; they can employ those people cheaper than we can employ people in America; but machinery mostly supplies in America the place of manual labour in Europe.

1200. Mr. *Newdegate.*] I have here an account of what the arms have cost at Harper's Ferry Armoury from 1831 to 1841, giving the number of muskets and rifles produced, and the average cost of each, and I find that from 1831 to 1841, that Government factory is stated to have produced those arms at 18 dollars 51 cents apiece. Do you believe that that account is true?—Is that an official statement from America? (*The same was handed to the Witness.*) I do not believe that they cost any such money.

1201. Will you state whether you believe that the subsequent table, in which it is shown that the cost of the arms from 1842 to 1851, inclusive, on the average of each arm, has been 21 dollars 51 cents, is correct?—No; unless only a few arms were made, and a large expenditure of money in improvements is included in the calculation; they may appear to have cost the Government that, but it never cost so much to make the arms alone.

1202. This is supposed to be taken from one of the accounts rendered to Congress, I conclude, or one of the public departments?—I suppose that was never taken from any such place.

1203. Have you never seen such an account?—No; whoever has compiled that account is not familiar with the facts.

1204. You entered into a contract to supply 4,000 pistols to the British Government; were those to be made on your own pattern, or on a pattern supplied to you by the Ordnance?—They were to be made upon a pattern received from me, and acknowledged to be very nearly the same; they were ordered after they were made partially.

1205. On your own pattern?—Yes, my kind of arms; if they want them changed, I offer to change them; I could make machinery applicable to make them.

1206. Have they been submitted to the Ordnance view, do you know?—My arms have been at Woolwich now for a year; they have been down there in almost all the varieties I make.

1207. That is the first pattern that you submitted to the Ordnance, but not a sample of the pistol which you have now supplied?—Yes, those have been down there for weeks.

1208. Your own pattern?—The pattern they adopted; they adopted my pattern; they adopted what I produced; they did not make me the arm first, and then come to me to make them, but they took my arm, the pattern approved by them.

1209. That is your patent, is it not?—Yes.

1010. You

1210. You have a manufactory, have you not, in America as well as in England?—Yes.

1211. Then you have a stock of those pistols, or of the materials of which they are made?—Yes.

1212. Of course that gives you a great facility to your supplying a large quantity at once?—Yes, a great facility.

1213. You keep a stock, and that is the manner in which you conduct your business, is it not?—I can produce a large quantity, and I have a large stock, of course.

1214. What is the price at which you have supplied those arms to the Government?—I supply them for anything I can get.

1215. What have you supplied them to the Government for?—I do not choose to tell you; the Government will answer that question for themselves; I will tell nobody what I supply my arms for. If you want to buy, and say you will buy 10,000 of them, and will give me a fair price you can have them to-day.

1216. How are we to estimate the cost of making the machinery by your process, if you will not tell us the price at which you make the article?—I will not tell you the price.

1217. Mr. *G. Dundas.*] You estimate that guns could be made in a very large number for about 30 *s.* each; of what wood do you propose to make the stocks; of walnut?—Yes.

1218. Do you use walnut in America?—Yes.

1219. American walnut?—Yes; which is quite as good as this (*pointing to the arm.*) I have sent to America for it to put on the ornamental pistols that I sent out to those men, who will pay another 1 *l.* for fancy work; it is prettier than this, and it is equally strong.

1220. Mr. *Walpole.*] You stated, did you not, that if the Government offered you a contract to supply 1,000,000 muskets, you would do it, upon an advance of 100,000 *l.* for machinery, in the end at 30 *s.* per musket?—Yes, 30 *s.*

1221. Supposing the Government were to offer you a contract for 200,000 muskets, and only for that number, what would then be the terms upon which you would undertake the contract?—I have already written it down. I say, that anybody to make only 200,000 should have 1 *l.* more a piece for them, and that would bring it up to 50 *s.*

1222. Lord *Seymour.*] When the Government contract in this country for muskets, they calculate that a musket will last for twelve years; can you tell the Committee, from your own knowledge of what takes place in America, how long the muskets supplied to the Federal Government are supposed to last?—It is almost impossible to answer such a question. If the same musket was put alongside the same number of English muskets used in the same service, I guarantee that the result would be in favour of the American musket, because it is a better-made musket; I am not familiar with universal service, and nobody is, but I know that many of my own arms come back to me, perhaps the main spring to repair, that were made in 1836. I have some specimens that have been through all the Mexican war, or in Oregon, where they have worn out the muzzle by rubbing in the holster, or being otherwise chafed in service.

1223. If you had a contract offered you, or anybody else, for 200,000 muskets, the stock and the machinery not being now here, how soon could the first 50,000 be supplied?—That is an impossible question to answer. I should suppose that machinery might be picked up to begin with at once, and before you got the machinery to do the finishing; first you begin with the forging; then there is the milling machinery, and by the time you come to the finishing machinery for the lock and stock, and putting them together, it would take some time. Anybody could go to America and get those machines built; but it would take six months perhaps to do anything. If you make them here it would take longer probably, but we have our patterns all ready in America. If you went here to a master workman who would have to get up his patterns, it would take longer than going across the Atlantic, and it must be more expensive, they not being familiar with it. Labour here is a little bit cheaper than it is with us.

1224. You would not undertake to supply the first 50,000 by the end of a twelvemonth from this time?—I should not like to undertake that; it would come very near to that, but if I did it, I should convert my own machinery immediately into your work; but if I had to start a concern, I should dislike amazingly

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amazingly to take a responsibility upon me like that. I do not think that there is an engineer in the country who would do it, except at exorbitant prices.

1225. Mr. *Muntz.*] I wish to call your attention to what you said about employing a number of men whom you considered more animals than anything else, because they knew nothing. I have been in the habit of coming in contact with a variety of workmen for the last 45 years, and have been to teach them their business. In conversing with your workmen, I found them a very intelligent set of men. I asked them several questions with respect to the parts of the work that they were doing, and I can confidently say that there were many that had been for years used to their own business; is not that the fact?—They have been used to answer the very questions that you put. In other words, they have but one answer to make, they have but one idea in their head, and that was created after they came into the shop. Some of them were taken out of the street as beggars for employment, or people wandering about that came to ask for jobs; sometimes the smartest men may be out of employment, and I pick the smartest that I can to apply them to a particular object, and when I have accomplished, through their means, the employment of a machine, if they cannot answer a question of anybody as to how they do it, I do not think that they ought to be put there. I turn away a great many; it is not all the men that you pick up out of the street that are smart, or can be made so.

1226. Colonel *Dunne.*] There is no absolute necessity for having a very highly skilled man for the work, is there?—Not here; the more ideas he has beyond the one, the worse it is for his employer. If he learns one thing perfectly, and can answer questions put to him relating to that particular action, that man is a valuable man to a manufacturer; but if he is studying astronomy while he is studying machinery, he is not worth much to the party employing him.

1227. Mr. *Muntz.*] What rate of wages do you pay these men?—I start with them at about 2*s.* a day, and get them up to 8*s.*, if they merit it.

1228. How long are they progressing from 2*s.* to 8*s.*?—I have been only working here a year, and some have not more than 4*s.*; others are worth 8*s.*

1229. Do some of them receive as much as 50*s.* a week?—Forty-eight shillings; they are men almost always self-created. In starting machinery, I sometimes find an advantage in taking a man who has been a machinist somewhere else, putting him on a machine, and making him a sort of master to look over other operatives. If I take a machinist who has some knowledge, I might give him 5*s.* or 6*s.*; if he is smart, I promote him a little, till I get him up to the highest price.

1230. You told the Committee that you were satisfied that an American gun made in an American establishment was a better gun than the Minié rifle now made here?—I said a better made gun; I did not say a better gun.

1231. You stated that your viewers in America would not pass such guns as the Minié rifle?—They would not pass such workmanship.

1232. What do you mean by, would not pass such workmanship; do you mean that the quality of the workmanship individually is bad?—No; I mean that a dozen arms of your construction are not so much alike as a dozen arms of our construction.

1233. The deficiency is want of uniformity?—Yes.

1234. At what date did you begin your establishment in this country?—The 1st of January last year I opened my books; I was getting the machinery in, and getting arranged. Some time before that I made a contract here for building an engine, but I did not consider myself going till some time within the last year.

1 35. Will you be good enough to state when you commenced the erection of your establishment?—The instant I got home, after I had ordered an engine here, which the contractors agreed to furnish in six weeks time, I made one lot of machinery in America to come here; I put that first lot of machinery in my own American manufactory, and I made a second lot of machinery, and that machinery I also put to work there; this was all done since I left, and since the great World's Fair. After putting the two lots of machinery to work at home, I wrote constantly to know when my engine ordered here would be done, and they said six weeks after the operatives went to work again. I came here with a third lot of machinery made to start this fabrication, and I waited three months before I got the engine going.

1236. When

1236. When did you first begin erecting the factory?—The building was erected; it belongs to the Government.

1237. How long did it take you to establish the machinery in it?—I cannot answer such a question. It took me longer to get my machinery to London after its arrival in Liverpool, than to bring it from New York to Liverpool.

1238. What was the date when you first began to erect machinery for your establishment here?—I cannot tell the date, but I can show the books.

1239. My object in putting the question is to ascertain how long it is probable the Government here will be in completing a manufactory, by ascertaining how long you had been?—That depends on how smart the Government is.

1240. Did you bring all your machinery from America?—All of any consequence. I could not get it here so cheap, to do the work as well. I went to America and sent certain machines here, and afterwards sent for more on my arriving here.

1241. What was the cost of the machinery?—It cost about 50,000 *l.* to start the establishment here, including machinery, fixtures, outside buildings, forging shop, &c. &c.

1242. Then you must have had to pay duty upon all that machinery?—Yes; I paid first a certain amount per cent.; now I think, it is by the ton. It is much cheaper than at starting.

1243. Can you tell the Committee how many pistols you made last year?—I took a year to start, owing to unforeseen difficulties to me in this country.

1244. But after you started your work?—I began to turn out pistols all the time. I can now make about 1,000 a week. I started first in January last year.

1245. What number did you make the first year of your work?—I did not make many; some hundreds; some thousands, perhaps. I would not undertake to deliver 100,000 arms within a year, unless I were thoroughly started. I might make a mistake, and if I contracted for a large quantity, I would not undertake to deliver the arms made here within a year.

1246. Suppose you had an order from the Government for a supply of your particular pistols, and you were also to apply your machinery to the making of rifles, how many could you make in the next month?—I could not tell. I could tell at the end of the next 12 months. I have to take that arm up and go through all the detail, contriving tools to forge it, and then afterwards to finish it. I say it is less trouble to make that arm (*pointing to the same*) than it is to make that little one before you, and less expense.

1247. Colonel *Maule.*] I think I understood you to say generally, that in the establishment of a new factory for making small arms by machinery you would not undertake to do anything in the first year?—I should not like to make a delivery in the first year. I should like an order for the second and third years at once, and then I should calculate to commence the work on the parts that could be most put forward; the first year would be a dead expense. The second year might live, and the third year I should begin to reap the profits. If *I had* 10 *years' business* I should calculate that the first five years would not more than pay the expenses. The profits would come in at the eleventh hour.

1248. Mr. *Muntz.*] With regard to what has been stated as to the relative cost of the arms in America, you seemed to think the account given by the Honourable Member for Warwickshire not a correct one; what do you believe is the present cost in America?—I do not think that the absolute cost is more than 2 *l.*, including the stock, bayonet, ramrod, and everything.

1249. Not a rifle?—I can rifle them for 1*s.* a piece English. I base this last opinion upon my own calculation. I would guarantee that any respectable manufacturer that would take these things up at the prices that I have fixed, and go to work, and get enough suitable machinery together in England, could do it; I can do it, and am not afraid to try.

1250. How many are the American Government making now?—I have already said, 50,000 a year.

1251. How long have they been making them?—I cannot say positively.

1252. You attributed the advantage of the American muskets, compared with the one before you, to their being quite uniform; you also stated that a great many were made in different parts of the country by individual makers; how

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how do those muskets so made answer in mixing with the Government muskets?—They are all the same, if made alike.

1253. Are they made by machinery, in the same way?—Yes, they all make them by machinery; even the little manufacturers.

1254. You have stated there were a great many arms, and duplicate parts of arms, sent into Mexico during the war; and that the different parts of the arms were sent back for repairs; how was it that so many repairs were required in so short a time?—For the reason that they had much hard service; a barrel is a good deal stronger than a mainspring, and it will last longer; the stock will not stand so much as the barrel, and the more perishable any one part is over another in any arm, the more likely is that part to fail.

1255. Is the wear and tear of the muskets which they make in America greater than in other muskets?—It is not so much as in other muskets, because the parts are better made, more uniformly made, and better fit together than any musket I ever saw in my life. I say it is a better musket for general use, and, like other muskets, it is liable to casualties; a barrel may burst, but if you burst one you may put the lock of it on to another whose lock is broken, and you have one good arm.

1256. *Chairman.*] Are revolving pistols more or less difficult of construction by machinery than muskets?—They require nicer and more accurate machinery.

1257. Colonel *Lindsay.*] You stated that you were obliged to get machinery from America?—Yes, I have been so; not that they have not the ability here, but it is because it was more quickly done, and more cheaply done, and suited my own fancy better.

1258. It was principally, was it not, because you had patterns already prepared?—Mostly. I made them myself, and other manufacturers helped me along.

1259. Had you those patterns with you in England?—No.

1260. If you had had them here when you came, could you have got the machinery made in England?—I do not know whether I could or not; but at that time, it was during the strike of the engineers here, and it was very uncertain about getting anything done. I do not think I could do it so quickly here as at home. If I had the models here, and took them to any of the machine makers, I think they could produce them in course of time.

1261. May the Committee take it as your general opinion that the artisans and makers here are perfectly competent to provide the machinery, if the Government had the patterns to give them?—Yes, but they might be a little more awkward and slow at first in the making of this curious machinery; *we* have some very odd machinery to make; for instance, the card tooth, machinery to make pens, and other machinery. These are the productions of particular manufacturers, and I should not like to take up the business of making card tooth machinery.

1262. Mr. *Newdegate.*] Supposing you were offered a contract on the same terms as our manufacturers, to make 50,000 muskets by machinery, at about what rate should you think it reasonable to supply them yourself, or to expect others to supply them?—I cannot answer that question; I do not know what you can do here yourselves; I barely say what I think can be done, and what I can do. If labour is not raised in price, I know what a person can do in a day on all the details of every operation done upon my arm, and I could tell you even as to the very operation of boring that hole (*pointing to the hammer of his own arm*), the cost of it per 1,000. There are hundreds of machine operations on that arm, and there is not one of them the detailed price of which is not upon my books, what it costs per 1,000.

1263. There is a great difference between your own pattern and the musket on the table, is there not?—I should say that I was not competent to make my own, if I could not make such *a thing* as that.

1264. The first cost of the first 50,000 would be greater than that of the next 50,000, would it not?—Yes; I would not undertake to make 150,000 arms without an extra pound, because so much money must be sunk in machines and fixtures to get fairly started.

1265. Colonel *Dunne.*] In adopting your pistol, have not the Government been satisfied

satisfied with the shape of your arm, and not bound you to any difficult machinery?—They have taken it, generally; they admit that my test was pretty good. Lieut.-Colonel *Sam Colt.* 16 March 1854.

1266. Do not you think they would do the same as to muskets?—A musket is an old established thing; it is a thing that has been the rule for ages; but this pistol is newly created; there is nothing that cannot be produced by machinery; if it is necessary to make that hammer (*pointing to the same*) in that particular form, it can be done.

Captain *Bernard Collinson*, called in; and Examined.

1267. *Chairman.*] WHAT office do you hold?—I am a Captain in the Royal Engineers stationed as Woolwich. Capt. *B. Collinson.*

1268. Are you a member of the committee on the musket factory?—Yes.

1269. Is the erection of the buildings more especially under your superintendence?—Yes.

1270. Have you examined Mr. Anderson's estimate of the cost of the building and machinery proposed by him for the musket factory?—Yes, I have; the estimate for the buildings is chiefly my own estimate.

1271. Is it your opinion that that estimate is sufficient?—Yes; I have consulted with several civil engineers and officers of the Royal Engineers on the subject of the expenses, and I have made some examinations about the ground and other things, and I consider that the estimate is amply sufficient.

1272. What is the amount of the estimate for the building?—£. 50,000.

1273. You consider that an ample estimate, do you?—Yes.

1274. Have you taken into consideration Mr. Anderson's estimate of the working expenses of the forgery?—Yes, I have looked over it, but I am not a very good judge of that.

1275. Lord *Seymour.*] You stated, did you not, that you considered the sum taken for the building amply sufficient for it, the foundations being at Woolwich?—Yes, for a building erected at the arsenal at Woolwich.

1276. Will you state what portion of the sum you have taken for the foundations?—I propose to lay the whole space of the building with concrete; it will take about 4,000 *l.* for the concrete.

1277. You were one of the committee who considered this question, were you not?—We have only considered the details, and the carrying out of the question.

1278. If the building is to be erected, you recommend its being built at Woolwich rather than at Enfield?—Yes.

1279. Why do you propose to abandon Enfield, and go to Woolwich?—I gave my opinion that the new factory should be built at Woolwich, partly because of the difficulty of getting the same amount of labour at Enfield, from having known Enfield and the neighbourhood, and partly because it is an advantage, it being a new kind of work altogether, to be quite clear of the old work; but chiefly on account of getting labour. I may also mention that there is not a very good site at Enfield for a building of that size, and it would be difficult and expensive to arrange it in the way that we propose to arrange it at Woolwich.

1280. At Enfield the foundations would be upon a better soil than at Woolwich, would they not?—Yes, when you got to the foundations it would be better, but it would be very expensive getting to them; it is so cut up with watercourses, that you would have to alter some of them.

1281. Supposing it is desired to manufacture 150,000 muskets in a year, you would have to bring persons accustomed to the manufacture from all parts of the country, would you not?—For some parts we should; for the barrel rolling, but not for the other parts, for that we expect would be made chiefly by self-acting machinery. That is one great advantage, and we consider that we should be able to get people at Woolwich.

1282. Do you think that the men that you have already would do the other parts?—Yes; the men we could get at Woolwich for the greatest part of the labour.

1283. Do you mean that the others would be unskilled labourers, or what class of men have you particularly at Woolwich?—No; we should have unskilled labourers at first; a great many young men and a great many boys.

1284. Then you would look forward to educating those men for the purpose?—Yes; they would not require much education; nothing compared to an apprentice that

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that has been brought up to a particular trade, where he requires six or seven years to learn it; I suppose that a few months would teach a man the work that we propose to do. Then of course a certain proportion of skilled men would be required, whom we should have to get from the gun trade from other places.

1285. In the various manufacturing departments now at Woolwich, do you take young lads who are unskilled at first?—In the artillery department, where they have been introduced a good deal of self-acting machinery, they take a great deal of unskilled labour, but in the laboratory department they are doing it chiefly by hand; but they have a great deal of trouble in teaching the boys and men.

1286. Even when you take unskilled labourers to attend to the machinery, you must teach them for a time before they are fit to attend to the machinery?—We found in going through several large manufacturing places that the masters all agreed that the men picked up the management of self-acting machinery very quickly indeed.

1287. In what time should you say?—I suppose two or three months, or something like that; it varies so much.

1288. You think, that in two or three months a man taken in, quite unacquainted with machinery, would become fully skilled in the use of it?—For a great deal of self-acting machinery; at Hibbert and Platt's, at Oldham, they had a great difficulty there, and during the great strikes two or three years ago they introduced self-acting machinery, and they brought in a good many new men, and my impression is that they said that those new men very soon learnt the use of self-acting machinery.

1289. Have you been accustomed to building barracks for the Ordnance?—I have been about 15 years in the service, and I have been employed in the Colonies in building barracks.

1290. When you build you enter into a contract with some contractor, do you not?—We draw the plans in the Royal Engineer Office, and make contracts.

1291. Do you employ one contractor for the whole work, and does he let off sub-contracts, or do you contract for different parts with different contractors?—Our practice is for every large work to make a contract for the whole, but we stipulate that the man shall not sub-contract without permission; for small work we should have a schedule of prices, and that is the way in which I propose to do this, by having a schedule of prices taking the brick-work at so much, and laying the floors at so much, and supplying cast-iron work by weight.

1292. Have the Ordnance estimates for barracks in your experience, invariably covered the expense of building the barracks?—I think in general our prices are high; I do not say that they have invariably covered the expense of building, I do not think that that has been from the prices.

1293. Still it has occurred, has it not, that the estimate of the expense for building a barrack has failed to cover the cost of the building?—I think, so far as I know, that has been generally from some alteration in the plan; I mean an alteration that was necessarily required when there has been a fault in the original plan, not from the prices.

1294. After it had been decided upon by the Ordnance?—At least the alteration in it, where it has occurred. It is certainly my opinion that the prices we generally adopt are high prices.

1295. In a building for this purpose would there be any liability to considerable alteration in the plan?—Our plan is such a very general one and so very simple, that it would be suitable for almost any kind of factory.

1296. If it were large enough?—It is upon that particular plan that we can very easily enlarge it.

1297. How many acres of ground do you take, or do you take many acres for this building?—It is about 500 feet by 300, between three and four acres, three and a half acres.

1298. To be covered by a building?—Yes.

1299. Is the adjoining ground where it is built unoccupied, so that it can be added for other purposes connected with the building, if required?—Yes, there are about 10 or 20 acres that could be used, all covered with guns at present, which would be removed.

1300. Colonel

1300. Colonel *Boldero.*] The building at Enfield where the arms are manufactured is a square, or something of that form, is it not?—No, not exactly. Capt. *B. Collinson.*

1301. It is closed in with gates, and walled round?—Yes. 16 March 1854.

1302. What is the area of it?—I suppose altogether it is an acre and a half; not two acres.

Captain Sir *Thomas Hastings,* R.N., C.B., called in; and further Examined.

1303. Mr. *Monsell.*] YOU have some papers which you wish to hand in, have you not?—Yes. (*The same were delivered in.*) Captain Sir *T. Hastings,* R. N., C. B.

1304. Mr. *Muntz.*] With respect to the first introduction of the Minié rifle, though there have been some variations made in it, it still remains a Minié rifle, does it not?—Yes. *Vide* Appendix.

1305. How long is it since the first introduction of the Minié rifle into this country?—In 1851, or the close of 1850.

1306. Was that when they were first brought before the Board?—Yes.

1307. Were any experiments made by the Government at Enfield as regards the manufacture and the cost, before they were brought before the Board?—No, not as regards the manufacture and the cost; the cost was obtained by noting down the cost of the materials and the cost of workmanship at Enfield in making a certain number of those trial arms; and then subsequently, when they were adopted, tenders were put out, and contracts entered into on such terms as the furnishers of materials, and the setters-up, took them at.

1308. Before you gave any orders you made your experiments as to the cost at Enfield, did you not?—Yes, and we obtained the cost of making up those arms in the way I have described.

1309. At what date was it first determined by the Board of Ordnance to adopt them?—A report was made by the Committee on Small Arms, composed of military, naval, artillery, and marine officers, and various trials were made with those arms; and on their report being given in, the Duke of Wellington and the Marquis of Anglesea decided that the Minié rifle should be adopted as the general arm for all the services under the Crown.

1310. Can you state what the date was?—I think it was in 1851. It was somewhere about May 1851, because I recollect that in June or July the final decision at the Horse Guards and in the Master-general's office was made, and two or three days after the decision was come to, the tenders were sent out, so that that fixes the date.

1311. Can you tell exactly the date at which the first tenders were sent out?—I think the 27th of July 1851. The contract for setting up was on the 4th of February 1852.

1312. When was the contract for materials?—The 27th of July 1851.

1313. When was the first pattern of the rifle fixed upon?—The first pattern of the Minié rifle was nothing more or less than the Belgian rifle. In passing through the hands of the Committee and the Inspector of Small Arms, and under the sanction of the Commander-in-Chief, and the Master-general of the Ordnance, some slight alterations were made in it. I think the grooves were reduced to three instead of four, but there was no essential change in it.

1314. Still, before any could be made or finished, the exact pattern was determined upon?—Yes, the exact pattern of that has not been altered; what we term the Minié rifle pattern of 1851 has not been altered.

1315. When was the pattern of the rifle of 1851 first given out to the manufacturers?—It could not have been later than early in July 1851, I should say.

1316. But there was an alteration in the pattern after that, was there not?—We distinguish it now as the "Minié rifle pattern 1851," the other we call the "Minié rifle pattern 1853."

1317. Did not some time elapse between the first tenders that were given out and the *bonâ fide* pattern being determined upon?—The rifle pattern of 1851 was determined upon in 1851, and it was supplied in 1853. The memorandum which I have here does not give the month. There will be no difficulty in furnishing the Committee with the date of the contract.

1318. I want to know the date at which the *bonâ fide* pattern was given out to the parties contracting?—I can give a short history of the dates, showing the first orders for the rifle muskets to the setters-up; the first orders to the furnishers of materials, and the first orders to the setters-up in 1851, and also in 1853.

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1319. The men could not possibly furnish the guns till they had the pattern, and I understand that some time elapsed between the original order being given and the time that the pattern was fixed upon?—No; I stated before that the setters-up asked us for time after the date of giving in their tenders. They did not say to us, the patterns are not ready, but, from certain causes give us a little more time, which was done.

1320. Is not it the fact that the real pattern at which they were to work was not fixed upon till 1852?—I do not think so; I will read from this memorandum:—"In May 1851, a new pattern rifle musket was adopted for the British army, and tenders, by competition, were obtained for the supply of the materials requisite, in addition to those in store which were applicable for setting up 28,000 rifle muskets. Great delays occurred in the supply of the materials, and sufficient were not collected to enable the Board to make contracts for setting up the muskets until the month of December 1851; and the muskets were not completed until November 1853." Now I wish to hand in a precis of all those papers which I hold in my hand. There are references from this memorandum to the papers referred to throughout, which will give perhaps a great deal more information than can be given verbally, and it will take too much time to read. (*The same was delivered in.*)

Vide Appendix.

1321. Is the fact stated in your original evidence with regard to the exact time at which the exact pattern was first agreed upon?—I think so.

1322. With regard to the crooked sights, in the first instance were they put on by the Board of Ordnance?—No, as I stated in my previous evidence, I believe that error to have originated with the inspector of small arms; it was a new work, and it was made out so clearly to the Master-general and the Board that we did not hesitate a moment, when it was discovered by the Guards, after a full consideration of the case, to take the arms from the setters-up, imperfect as they were.

1323. Were the sights first put on by the Board, and if not, when did the Board first put them on?—They were to be put on by the setters up.

1324. Under the directions of the inspector?—No, they were to set them up correctly themselves; but the Committee will perceive at once the error has originated probably in fixing the front sight; at all events, the error is one which originated with the inspector of small arms, and I think the setters-up admitted afterwards that they perceived it at an earlier period, and I think they ought to have made a communication to the Board on that point, which they did not do, and we knew nothing of it.

1325. But the inspector invented machinery to fix those sights?—Yes.

1326. Do you know whether or not the workmen who were manufacturing the articles objected to the principle of putting them on to him?—I have heard that they did, and that was one of the points which led to the decision that the arms ought not to be rejected on that account, and that they should be, and were taken into store.

1327. That was acknowledging that there had been some error on the part of the inspector?—I have stated that in my evidence before.

1328. Was any time lost in the execution of the order?—I think not, but I do not know. It did not appear to me, when the examination took place, that any time worth consideration had been lost.

1329. Colonel *Maule*.] Was any complaint made of loss of time by the setters-up?—Not at that time.

1330. Mr. *Muntz*.] That was the order for the first 23,000, was it not?—Yes, 28,000; but 5,000 were set up at Enfield, and 23,000 at Birmingham.

1331. As those contracts were progressing, there were no further contracts given out?—No.

1332. Was any expectation held out that there would be any further contract?—There was no further contract for the Minié arms; but there were contracts, which those papers will show, for some line pattern muskets, and for carbines for the colonial service, for extra service muskets, and sea service muskets, with the view of furnishing employment to the operatives engaged in those works.

1333. Do you recollect whether any complaints were made by the contractors of the want of a succession of orders, or employment?—Yes, we have had many complaints as to the Minié rifle pattern of 1851, since that arm was stopped on account of the improved arm that has since been adopted.

1334. You

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1334. You received a memorial from the workmen on that subject, did you not?—Yes.

1335. And that memorial you said you would lay before the Board?—Yes.

1336. That was relative to a succession of orders that would give them constant employment and prevent the loss they sustained in consequence?—Yes.

1337. No answer has been sent to that memorial, has there?—I think I stated in a letter to you that that memorial was placed before the Master-general and the Board, and would be answered when they had arrived at a conclusion; and the conclusion at which they arrived was, not to set up any more of the smooth bore muskets, and therefore to wait till the rifle musket pattern, 1853, was settled, and that pattern would have been put out, in all probability, at an earlier period, if the contracts for the Minié rifle, both the materials and the setting up, had been sooner fulfilled.

1338. But no answer was given to the memorial?—No, because the thing is undecided whether it would be possible to set up more of the smooth-bore arms for the State. I should add, that in one of the offers made to the setters-up, they were offered some line pattern muskets at one time when they applied for work, and they said, "No, it will not do for us to set them up, because those arms require more skilful workmen; but if you will give us the extra service arms, and the sea service arms, then we can get on with them, and employ the people." To some extent that was done, so far as the requirements of the service went. I think, after looking about, I found that 12,000, I cannot be exact, but a considerable number of sea service arms might be set up, and a certain number of pistols and carbines, and all with a view to give employment to the trade of Birmingham; and we had had many complaints from the trade in London that we have dealt unfairly by them in not giving them orders. But we had a particular order, which we intended to give out to the trade of London; but that order, which had reference to the coast guard arms, from various circumstances arising in the different departments, was put off.

1339. Were not a great many complaints made to the Board with respect to the vexatiousness of the view of the materials?—Yes; and one of the papers which I have before me, perhaps I may be permitted to read, as it bears directly upon the question. This is the letter of complaint alluded to: "Birmingham, 31 March 1852. My Lord,—As we consider some explanation is due on our part, as to the charge brought against us of combining to charge the Board of Ordnance 21 *s.* for a musket barrel in 1839, we beg to call your Lordship's attention to the following facts: that price was quoted at a time when we scarcely knew what was required, and under a refusal from Mr. Manton to be allowed to make a few before quoting a price; also in the face of a strike with our grinders, upon whom we were at that period much depending, owing to the few hands in that branch of our trade who were sufficiently skilled to operate upon that description of barrel. At the earliest opportunity we substituted (at great expense) machinery for that portion of our labour, and in no instance since that date have we had any stoppage in our trade, either from strike or any other cause detrimental to the interest of the Board; and your Lordship will perceive, that even whilst our books were full of orders, both from your Honourable Board and the Honourable East India Company, every disposition was shown on our part to meet the suggestions of the Honourable Board, and that every alteration since that time has shown a reduction in price, which was fixed in 1839 by Mr. Manton, your then inspector of small arms, at 13 *s.* 6 *d.* You will be pleased to observe, my Lord, that our present demand is not for any increase in price, but simply to have the article we are producing brought before a just and competent tribunal, and also that any further increase of your manufactory at Enfield may be suspended until a fair competition has been obtained." This is from the barrel makers at Birmingham. Then I have here a paper which shows the number of "barrels rejected at Enfield in 1852, previous to proof and final view, and after proof and final view," which paper I will hand in to the Committee. (*The same was delivered in.*)

Vide Appendix.

1340. Colonel *Maule.*] Was not there a deputation of the barrel makers?—Yes.

1341. You had better read that paper now?—"Memorandum of an interview between a deputation of gun-barrel makers attended by Messrs. Newdegate, Spooner, and Muntz, and the Master-general and Clerk of the Ordnance, and the principal Storekeeper of the Ordnance, on the 22d March 1852. Complaint. It was alleged on the part of the gun-barrel makers that they had expended a considerable

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considerable capital in the erection of rollers and machinery for making gun barrels for the Ordnance service, and that they would suffer great loss if the said barrels were made in future at the Ordnance manufactory at Enfield, and their machinery thrown into disuse. That the erection of machinery for that purpose is unnecessary, as the barrel makers are capable of manufacturing all the barrels required, and are and have been quite willing to do so." The answer to that is, "In answer to this it was represented that the Ordnance were unable to obtain from the trade the barrels required in time to meet the wants of the service. That the contracts entered into for the new rifle musket barrels on 6th June 1851, which should have been completed by the 20th February 1852, are yet in a very incomplete state; that a contract entered into by the Board for certain double-barrelled carbines, which were pressingly required, and which were undertaken to be supplied in six weeks, were not delivered for six months, in consequence of the delay on the part of the barrel makers in furnishing the barrels; that a system of combination existed among the barrel makers, who have made exorbitant demands on the Ordnance for barrels, particularly on one occasion, when, tenders having been called for, the whole of the makers, ten in number, tendered in one price, viz., 21 *s.* each, for barrels which were not worth more than 12 *s.* each, and were ultimately obtained for that price."

1342. Mr. *Newdegate.*] You have not given the date when the 21 *s.* was demanded?—The paper I have put in shows that; but if it should not I can supply it: "The Master-general therefore could not accede to the application of the barrel makers, but would proceed with the erection of machinery for making barrels at Enfield, as directed by his Lordship's predecessor, the Marquis of Anglesea, and sanctioned by the Treasury. The barrel makers disclaimed all knowledge of such a combination, and of a demand for such a price as 21 *s.* Mr. Ezra Milward particularly denied the truth of the allegation, and stated that the matter ought to be inquired into. The papers were obtained from the record-room; the fact was confirmed, and Mr. Ezra Milward's tender at 21 *s.*, with his own signature thereto, was produced, together with nine other tenders, at the same price." Now, the next is a complaint: "The barrel makers allege that they are subject to much vexation and loss from the mode of viewing the barrels; and that the mark which used to be placed on the rejected barrels having been withdrawn, the barrels which have been objected to are often presented for use several times, and that many of them which were at first rejected have subsequently been received. And further, that the rejections are often capricious and without just cause; that against such vexations they have no redress, there being no control over the viewers at Birmingham, and no one to whom they can appeal, except the inspector or assistant inspector of small arms, on their monthly visits to Birmingham. And further, that an appeal to the inspector of small arms, Mr. Lovell, is of little avail, as he has always sided with the viewers; that the regulations are more numerous than under any former contract, which the barrel makers attributed to a supposed hostility towards them on the part of Mr. Lovell, which, as they alleged, arose from a desire to favour the Ordnance manufactory at Enfield, with which he is connected, and also to favour one of his sons, who has set up a manufactory of small arms at Liege, to further which he has availed himself of his official character to obtain plans and measurements of their furnaces and machinery. If the Master-general and Board decided that the manufacture of barrels should take place at Enfield, the contractors requested that impartiality might be exercised with regard to the view of the barrels so made and of those supplied by contract." The answer is, "It was admitted that the mark formerly stamped on the rejected barrels had been discontinued, and without any authority from the Board; but it had been discontinued at the request of the barrel-makers, and for their accommodation, as the rejecting mark became known, and prevented the makers from selling the barrels to the trade. The Master-general directed the rejecting mark to be again used. With regard to the view, it was not admitted to be unduly severe. It is strict; but the barrels being for rifles, it is necessarily so; moreover, strictness of view has always been a complaint with the contractors, and therefore in undertaking the present supply, the contractors had no reason to expect it would be otherwise than strict. The Master-general and Board would, however, inquire into the present system of view, and if any part of it should be found to require alteration they would endeavour to make it. They, however, repudiated all insinuations against the integrity and conduct

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conduct of Mr. Lovell, who had been a zealous servant of the public for 40 years, whose unpopularity with the contractors might have arisen from his vigilance of the public interest, and against whom not any insinuation had been supported by proof." That is signed by Mr. Wood, the secretary, who was then chief clerk, who attended at the time of this interview and made this minute?—Will you point out where the date of that offer to make the barrels at 21 *s* is given in the papers submitted to the Committee?—I submit that this which passed in the presence of the Honourable Member, and of the deputation of the barrel-makers who attended the Ordnance, when Lord Hardinge was the Master-general, would surely, if it could be proved and verified by Mr. Wood, be the most conclusive document that you could have, because he heard their complaint, and having heard it, and what could be said against it, he gives the decision which I have just read.

1343–4. I do not dispute that that would be conclusive; but, so far as that goes, in one respect it is insufficient. I want to know the date of the offer cited in that document, when 21 *s.* was asked for the barrels?—I will read this paper dated the 31st of March, 1852:—"My Lord, as we consider some explanation is due on our part, as to the charge brought against us of combining to charge the Board of Ordnance 21 *s.* for a musket barrel in 1839."

1345. To make the matter clear in evidence, it was in 1839 that this demand was made for 21 *s.*?—Yes.

1346. And for what particular description of barrel was that demand made; was not it for a twisted rifle barrel?—No, certainly not; that took place before I was at the Ordnance; but in reading over the paper, I believe it will be found to be a common, good, first-rate, smooth-bored barrel.

1347. You do not state that with certainty; it is a matter for which you trust to your memory?—I can state it so far positively as this, that recently I have read over almost all the papers on this subject, and that impression is left on my mind; but I cannot recollect the date.

1348. Will you be so kind as to furnish the Committee with the particulars of the contract to which that offer has reference, the offer of 1839?—I would also read this paper, which is a memorial from the barrel-makers, dated the 22d of March 1852: "My Lord, having understood that the Honourable Board of Ordnance contemplate manufacturing the musket barrels required for their department, to a much greater extent than has hitherto been the case, and that machinery for the purpose is now in progress, we, the undersigned barrel-makers, feeling ourselves aggrieved, having some few years ago gone to great expense in plant and machinery (the greater part of which is now unemployed) to execute orders to a large extent for the Honourable Board, which we flatter ourselves have been perfectly satisfactory both as to quality and quantity required, feel assured that some misrepresentation must have been made to your Honourable Board detrimental to our interests, or such steps would not in justice have been taken." It so happens that a copy of the contract is within this paper of 1839, which I had better read. "Mr. Lovell presents his compliments to Mr. Butler, and begs to enclose a statement in detail, showing the progress made by each of the master barrel-makers at Birmingham up to 13th instant, in the contracts entered into under the Honourable Board's order of 6th June 1851 (S/1361), for the supply in the aggregate of 23,000 barrels for rifled muskets in the filed state. The 5,000 barrels in the rough rolled state, included under the same order, have been all supplied in due course. As an illustration of the entire monopoly which has always existed in this branch of manufacture, Mr. Lovell begs to enclose the copy of an order that he received from the Honourable Board on 20th February 1839, when all the barrel-makers joined in demanding one and the same price, and that price 21 *s.*, when the real value was not over 12 *s.* Since that period, from the same combination, the department has, at several times, been forced into paying for barrels in the rough rolled state and lumped, to be bored, &c. at Enfield, musket, weight 8 lbs. 10 oz., 5 *s.* each, or 64 *l* per ton; rifle, weight 6 lbs. 10 oz., 5 *s.* each, or 84 *l.* 10 *s.* per ton; carbine, weight 5 lbs, 11 oz., 4 *s.* each, or 78 *l.* 16 *s.* per ton, when the iron of which they were made did not exceed the price of 20 *l.* per ton. And under the order above quoted of 6th June 1851 for rough rolled musket barrels not lumped, at the rate of 42 *l.* per ton, when the iron cost no more than 18 *l.* per ton, and this solely because the Ordnance Department had not the means and machinery for making the barrels in the

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Royal manufactory, where there is an abundant power of water unemployed. It will be seen by reference to the last series of tenders offered, that they are all at the same price, which shows that there still exists the same combination amongst the barrel-makers at Birmingham. And it must be always borne in mind, that military barrels are not made at any other place in the United Kingdom. Small Arms Office, Tower, 18th March 1852. (A true copy.) *J. Wood*, Secretary." "Office of Ordnance, 20th February 1839, (O/483.),—Sir, Proposals having been received in consequence of the Board's order, dated 4th instant (P/535), for the supply of 1,000 barrels for percussion muskets of Lovell's pattern." That fixes the barrel which the Honourable Member wishes to know about; it is the smooth bore, perhaps a little inferior to the present line pattern of 1842. "Mr. Grimley, at 21*s.* each, at 100 per month; T. Turner, 21*s.* each, for 100; Sargent & Son, 21*s.* each, time of delivery not specified; J. Portlock, 21*s.* each, 50 per month; Westwood & Son, 21*s.* each, 100 per month; E. Millward, 21*s.* each, for 100; Beasleys & Farmer, 21*s.* each, 300 or 400 per month, after completing present order; J. Clive, 21*s.* each, 100 per month; W. Millward, 21*s.* each, 100 per month; W. Deaken, 21*s.* each, for 100, and the price being the same in all the tenders, and greatly above that proposed in Mr. Porrett's report, dated 9th ultimo, (P/463), to be paid for those barrels, viz. 12*s.* each. I am directed to acquaint you, the Board wish you to proceed forthwith to Birmingham, with the view of obtaining competent workmen, and making such arrangements as may be necessary for the manufacture of these barrels at Enfield; the Board conceiving it desirable to adopt this course in consequence of what has now been elicited, and it being probable that they will have to set up for some years percussion muskets at the rate of 5,000 in each year. I have the honour, &c. (signed) *G. Butler*, for the Secretary. (A true copy.) *George Lovell*, Inspector of Small Arms, 18 March 1852. *J. Wood*, Secretary."

1349. At what rate was that contract eventually completed?—At 13*s.* 6*d.*

1350. Colonel *Maule.*] I think I understood you to say, that those contractors who asked 21*s.* for the barrels, afterwards completed them at 13*s.* 6*d.*?—Yes, I believe so, they being estimated at 12*s.* as to the real value. "Various suggestions having been offered for the improvement of the fire-arms used in Her Majesty's service, a committee on small arms was appointed by the Master-general, in conjunction with the Commander-in-Chief, on the 27th September 1848, and many experiments were made before the committee. The several projects for loading arms at the breech were reported on by the committee, on the 1st April 1851, and rejected. Of these, the musket adopted in the Prussian service, called the needle-priming musket, obtained the most attention, but was objected to on account of escape of gas at the breech. The committee having, on the 30th April 1851, reported on the muskets loading at the muzzle, the carbine Rayé, à balle Minié, procured from Belgium, was adopted, with a reduction in the length of the barrel from 3 ft. 6 in. to 3 ft. 3 in. This arm was approved by the late Commander-in-Chief on the 13th May 1851 (M/158), and is now called the new rifle musket of 1851. The Master-general (Lord Anglesey), by a minute dated 10th May 1851 (S/1307), directed that the whole of the amount available for the purchase of small arms in the year 1851-52 should be applied, with the least possible delay, to the construction of arms of the newly adopted principle. The Board proceeded immediately to carry the above order into effect; contracts were made for such of the materials as it was necessary to purchase, viz., barrels, sights, bayonets, &c., and such articles in store as were applicable to the new arm, viz., locks, stocks, &c., were brought into use in the months of May and June 1851; and, as soon as the patterns could be prepared, 5,000 of the new muskets were ordered to be set up in the Royal manufactory at Enfield, and have been completed. Contracts were made on the 4th February 1852 (C/2375) for setting up 23,000 muskets of the same description at Birmingham, and these will be completed by the 31st March next. The cost of these muskets was as follows: new rifle musket, pattern 1851, 2 *l.* 13 *s.* 7 *d.* each. The last price of the percussion musket of 1842, was 2 *l.* 16 *s.* 8 *d.* each. It was necessary to have ready for issue a large portion of the materials in complete sets, before the contracts for setting up the muskets could be entered into; and although every exertion was used, these could not be got together from the manufacturers so as to enable the Board to call for tenders before the end of 1851. After the contracts

tracts for setting up the muskets were made, it was some time before the contractors could make any progress, in consequence of combinations amongst the workmen, and disputes respecting wages. Thus two years have nearly elapsed before 23,000 muskets could be obtained from the trade, showing how little dependence can be placed on that source for any prompt supply in case of emergency, the contractors having represented that they have employed all the men at Birmingham available for military gun work. At the end of January 1853, the total number of new rifle muskets completed and received into store was 17,881, and there had been issued to regiments of the Line 7,627, Royal Marines 205, Royal Navy 103, Cape of Good Hope 536, other services 134, making the total number issued 8,605. There are, under orders to be issued to the troops for the purpose of exchanging the Brunswick rifle in the possession of the rifle corps now in Great Britain and Ireland, and of completing every company of infantry at home with 25 stand, 7,397, making the total number issued, and in course of issue, 16,002. It is to be observed that the gunmakers at Birmingham only were employed on the above arms, the offers from that place having been lower than those from the London gunmakers, and it was expected that the operatives in London would have followed the work to Birmingham, but this is stated not to have been the case. Had the latter been employed, more muskets might have been set up within the time; yet there would have been a difficulty in obtaining materials wherewith to set them at work, as they can only be obtained from Birmingham, and nearly two years have elapsed before the materials for setting up 28,000 Minié rifles, pattern 1851, were supplied."

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Veneris, 17° *die Martii*, 1854.

MEMBERS PRESENT.

Sir W. Molesworth.	Colonel Lindsay.
Mr. Monsell.	Lord Seymour.
Mr. George Dundas.	Mr. Muntz.
Colonel Boldero.	Mr. Newdegate.
Mr. Walpole.	Colonel Dunne.
Lord Paget.	Mr. Geach.

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Mr. *James Nasmyth*, called in; and Examined.

Mr. *J. Nasmyth.*

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1351. *Chairman.*] ARE you acquainted with machinery?—Yes.

1352. Are you an inventor of various machines for economising labour?—I have contrived a great many machines for that purpose.

1353. Will you mention some of them?—There is the steam hammer, which has had an important effect in that way, and several modifications of the planing machine.

1354. Have you ever examined the different parts of a musket?—Yes.

1355. Are you well acquainted with the forms of its various parts?—Generally.

1356. Are you acquainted with the manner in which the gun trade is carried on in this country, at the present time?—Yes, I have some idea of it.

1357. What is your opinion with regard to the possibility of introducing into the gun trade, a system of manufacture similar to that which prevails in the better conducted machine-making establishments?—I should say that it is both highly possible, and most desirable, and very much wanted.

1358. If such a system were introduced, would it, in your opinion, tend to lower the present price of a musket, supposing the quality to remain the same as it is at present?—It would at once lower the price very considerably, and raise the quality; for this reason, that the very machines that will be required to be employed to lower the price would also perfect the manufacture.

1359. Why so?—By dispensing with the dependence upon manual dexterity, and substituting the unerring precision of mechanical tools; a principle well

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ascertained, recognised, and carried into effect in many other branches of manufacture in this country, but not hitherto in the musket trade, so far as I am aware.

1360. Do you consider that it would not be difficult to construct machines to provide the several parts of a musket?—Not at all difficult, and to a great extent it is done already.

1361. Do you consider that the different parts, if made by machines, would be more uniform in their dimensions than is produced by hand labour?—No doubt of it. It would result in impressing absolute identity on the parts.

1362. Would they be more likely to be more correct as specimens of workmanship, if made by machinery, than if made by hand in the old way?—Yes, decidedly.

1363. Would the parts then be more likely to fit with accuracy?—They could be made so perfect as to fit promiscuously.

1364. Would that strengthen the structure of the musket?—Yes; and it would not only improve the strength, but the durability; the durability of a mechanical structure depends much upon the proper bearing of all the parts upon each other, and if it is inaccurately made, and certain parts only touch at certain points, those certain points get soonest worn, and the structure becomes shaky and loose, and has all the characteristics of age upon it; but if from the outset the parts bear true and flat together, the extended surface that you get for the action of the parts will most materially improve their durability.

1365. Will that result be more likely to be produced by machinery than by hand labour?—That would be the inevitable result of the introduction of machinery.

1366. Have you ever visited Colonel Colt's manufactory?—I have.

1367. What effect did that produce upon your mind?—It produced a very impressive effect, such as I shall never forget. The first impression was to humble me very considerably. I was in a manner introduced to such a masterly extension of what I knew to be correct principles, but extended in so masterly and wholesale a manner, as made me feel that we were very far behind in carrying out what we know to be good principles. Most of the intelligent mechanics of this country are well acquainted with what are the correct principles of carrying out the details of manufactures; but there is a certain degree of timidity resulting from traditional notions, and attachment to old systems, even among the most talented persons, that they keep us considerably behind. What struck me at Colonel Colt's was, that the acquaintance with correct principles had been carried out in a fearless and masterly manner, and they had been pushed to their full extent; and the result was the attainment of perfection and economy such as I had never met with before; one of the important results of this was the employment of unskilled labour as the agent for managing those machines. That last condition was one of the most impressive of all, and certainly the most encouraging result, to show that if we took the right means we do not require to depend upon what are reputed to be the regularly-bred mechanics in the particular line, or what we call skilled tradesmen. As an instance I may mention that in the management of several of those admirable machines at Colonel Colt's, in many cases you find a young man superintending four machines at once, each producing with absolute accuracy and in great rapidity the article required. After being struck with this, I asked several of them in a familiar manner, "What line of business were you in before you came to this place?" and the first answer was, "I was a butcher." Here then was a young lad who had been a butcher, brought in, I believe, from poverty, picked out of the streets; he was found to be an intelligent lad, and he was put to those machines, and there he was managing them in a most skilful manner, which the most thoroughbred mechanic could not exceed. In the next case the man had been a tailor, and in the next case a gentleman's servant. Those were young men who had been wandering about the streets, and that had offered themselves; and Colonel Colt had, with that same skill that has contrived his establishment, picked up the kind of intellect that he wanted. The great result of employing proper machines is, that you do not depend on dexterity. All you want is intellect, and the faculty of managing machinery. You do not require manual dexterity. The brute force is supplied by the machine, and the dexterity by unerring principles, carrying out those systems that were originated by Sir Samuel Bentham, Mr. Maudsley, and Brunel, in the block machinery.

1368. Do

1368. Do you consider that the revolving pistols of Colonel Colt are made cheaper and more perfect by machinery than by hand labour?—No doubt of it.

1369. Supposing the Government gave you an order for 1,000,000 of muskets, would you, as a manufacturer acquainted with the machinery of the day, be inclined to order them from the present gun trade; or if you could raise the necessary capital, would you embark that capital in providing plant, and machinery to produce them?—I would do in the gun trade what I do in my own business; I would have recourse to mechanical contrivance, and dispense as far as possible with the reliance upon manual dexterity, and the result of that would be the increased perfection of the article, and increased economy.

1370. The question you were asked was this. Supposing an order were given to you by the Government for 1,000,000 of muskets, would you endeavour to produce them by machinery, rather than procure them from the trade?—Decidedly.

1371. Have any improvements been made within the last few years in the mode of stamping or forging wrought iron articles?—Yes, very considerable.

1372. Will you describe them, if you please?—I may say that I have contributed considerably to that improvement myself by introducing a modification of the steam hammer for that purpose. Where the alteration has been carried out with the greatest success has been in Russia. I have been employed by the Russian Government to supply those machines for that very purpose.

1373. Have you made machinery to produce the parts of a musket for the Russian Government?—Only the stamps; no other machines yet.

1374. When did you make that machinery?—About four years ago.

1375. Do you know how far the Russian Government make their muskets by machinery?—The establishment at Toola is almost equipped with machinery; they have a great many machines there.

1376. Do they make most of the parts of their muskets by machinery?—Yes.

1377. Did you make an estimate for constructing every part of a musket, except the stock, for the Russian Government?—I did.

1378. When did you make that estimate?—Two years ago.

1379. What was your estimate?—About 12,000 *l.*

1380. Could you exhibit to the Committee specimens of the results produced by the machinery you supplied?—Yes, I have got specimens sent over to me from Russia, the result of those stamps which I have; these are the parts of Russian muskets (*exhibiting and explaining the same*). To shew the integrity of each part, they have sent me duplicates just as they came from the stamp, and others left with a little frill, not filed; they have been struck; I believe they have the same process at Birmingham, but I think it is done in a ruder manner.

1381. Will you describe briefly what those specimens are?—These are various parts of the Russian regulation musket.

1382. How are they made?—The way is by the same principle as they have in Birmingham; there is a die with half the contour of this (*describing the same*) sunk into it, a bottom die; then there is a top die, and they can set them together so exactly, that when they come together it would result in this. These dies are very exactly adjusted to each other, and one is fastened to a hammer, drawn up in my system by steam, and allowed to fall upon the piece of iron; and the result of one blow, or a succession of blows if desirable, is the article itself.

1383. Are such articles as those likely to be correct, and to cost less, if made by machinery instead of by hand?—Infinitely less, with the advantage of absolute certainty stamped upon each; if there were 10,000 or 100,000 required, they would be all identical.

1384. Are you acquainted with the stereotype system of casting?—Yes.

1385. Do you consider that system likely to be applied with advantage to the brass parts of a musket?—Yes; both to the brass and the cast-iron parts.

1386. Have you seen the present hammer of the Minié rifle?—Yes.

1387. What is your opinion with regard to the possibility of finishing it throughout by machinery?—I should think, with a properly contrived machine, it would be quite possible to dispense with hand-labour in the production of that particular part of a musket.

1388. With regard to the guard of a musket, you are acquainted with its form, are you not?—Yes.

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1389. Supposing it were determined to adhere to the present form, could it be made by machinery?—Yes, decidedly.

1390. Are you acquainted with Mr. Anderson?—Yes.

1391. Are you aware of his capabilities as a mechanic?—I have known him at Woolwich for the last eight or nine years, and I consider him a most skilful and intelligent mechanic.

1392. Are you acquainted with Mr. Anderson's estimate for building a factory, with machinery for making muskets?—Yes, it has been submitted to me, and I have looked it over.

1393. What do you think of it?—I think it is a very liberal one.

1394. The sum which he has estimated it at is 150,000 *l.*, is it not?—Yes.

1395. Do you think that that sum would be sufficient to build and put up a perfect plant, including perfect machinery, capable of producing, according to his statement, 500 muskets a day, equal in quality to those now made for Her Majesty's service?—Yes; I think that if proper steps were taken, it would be ample to accomplish that purpose.

1396. That is your opinion, as a person well acquainted with machinery, and the cost of making it?—Yes.

1397. Have you formed any opinion as to how long it would take to erect such an establishment as that described by Mr. Anderson, in order to produce that number of muskets; namely, 500 a day?—I should say from 12 to 18 months might be required to erect and organise the establishment, and get it into complete working order.

1398. At the end of 12 or 18 months, do you think that there would be a manufacture of 500 muskets a day?—Yes, I think so; that would be the result.

1399. You state that you have examined Mr. Anderson's estimate?—Yes.

1400. Have you gone through it carefully?—Not very carefully; I have looked it over, and the sums that he has appropriated to each item I should consider a very liberal amount, and likely to leave a surplus.

1401. Have you looked at it with sufficient care to be able to state to the Committee that in your opinion it is a covering estimate?—Yes, I think I could venture to say so; much would depend, of course, upon the manner in which the establishment was carried out in the way of contracts, and proper contracts made, so that the various works were done in the time and for the amount named; but I think that, with common prudence in making up proper estimates and contracts, that would be obtained.

1402. You think, therefore, that if proper care were taken, there would be no difficulty in constructing such a factory in 18 months, at a price not exceeding 150,000?—Yes, I think that the price is quite liberal.

1403. Lord *Seymour.*] You think it very desirable, do you, to increase machinery in making muskets generally?—To introduce machinery.

1404. Even without reference to the necessities of the Government, for the trade of the country you think it desirable?—Highly desirable; I believe that the master gun-makers in England are at present groaning under a kind of tyranny resulting from their dependence entirely upon the dexterity of their men; so much so, that those very gun-masters themselves would hail it as an emancipation most desirable to be attained; they are absolutely groaning under this tyranny, and are afraid to introduce the most obvious improvements, lest the men should turn out and strike against those improvements.

1405. If it should be true that the authorities of the Ordnance have rejected articles which were according to their pattern, when such articles were made by machinery, then it would seem to follow that the Ordnance had rather assisted and promoted this tyranny under which the master manufacturers were groaning?—I do not know that they have.

1406. If it should be the fact that when articles, made by machinery, were brought to the inspector of small arms, they were rejected by him simply because they had been made by machinery, do you think that that was an encouragement to making them by machinery?—Certainly not.

1407. Is it not on the contrary a great discouragement to using machinery?—Decidedly.

1408. Then if the Government have discouraged the use of machinery to that extent, they have so far assisted in keeping the master manufacturers under this tyranny

tyranny of their men?—If they have done so they have done very wrong, and very absurdly.

1409. As you are acquainted with the manufacture of guns, what do you think of the system of making separate contracts for the different parts of a musket, instead of making a contract for the musket complete?—I should not approve of that; I think there would be a liability to a want of that certainty, and that fitting together of the whole of the parts as a perfect whole, that would not exist if the process was conducted in a systematic manner under one superintendence and in one establishment, where one system would pervade.

1410. Do you think that the system of entering into contracts for the small parts of a musket instead of entering into a contract for the production of the finished article, is a bad system?—As bad as possible.

1411. Then the system which the Ordnance have been pursuing for many years past is, according to you, as bad as possible?—It is most absurd, and I have no hesitation in stating that most broadly.

1412. It must have tended to prevent one person providing machinery for making all the different parts of a musket, if he could only have a contract for one part?—He ought to have made a machine to make that part if he had studied his own interest; if only to make a single screw, he ought to have used a machine, because it perfects and economises at the same time.

1413. You stated, did you not, that to a great extent machinery is now used in the gun trade?—No; I should say quite the reverse; that the employment of what we call tools; machinery is the exception, and not the rule of the gun trade; in England there is too much dependence upon hand labour and dexterity.

1414. For making articles that require great accuracy and precision the more that hand labour is dispensed with, and the more machinery is introduced the better?—No doubt of it; I think that is almost a postulate now, admitted on all hands.

1415. For instance, in watchmaking, you think that ought to be all done by machinery?—It ought.

1416. For example, the best chronometers; are they made by machinery entirely?—I am not acquainted with that trade; I have understood that Dent adopted tools for the purpose of making his chronometers, but it is only by hearsay.

1417. You are not aware whether machinery is used to a great extent in the manufacture of the best chronometers?—No, I am not aware; but as a general principle I should say that in all my experience machinery perfects, and there is no instance that I ever remember in which the quality of any article has been depreciated, and the cost increased, by the introduction of machinery; the use of all machinery has been abused to making things in a miserable way, where quantity and not *quality* was the object. I should say that that was the exception in the application of machinery.

1418. You think that in some cases machinery has been abused in that way?—Yes, merely to make an increased quantity.

1419. You stated, did you not, that you had made a machine for the Russian government, by which the parts of a musket had been made?—Yes.

1420. Is this (*pointing to the specimens*) the state of finish to which the machinery brings them?—So far as the stamping process goes; that is all I have had as yet to do with. By machinery, I have estimated for 12,000 *l.* a complete system of machinery for executing all, and putting as it were the workmanship upon them, and bringing them to that state in which they would finally go into the stores.

1421. Are you aware whether the finishing is carried on by machinery there?—Yes, it is.

1422. But you did not make it?—No, it was made at Toola by the Russians; but they are so well satisfied with the results of it, that the Government have determined to extend it very considerably, and hence the demand for the estimate which we handed in of 12,000*l.*, which was to be mere reduplications and extensions of those machines that they have already at Toola. I must say that they are very admirably contrived; they were submitted to me to modify where I thought fit, but there was very little for me to suggest; the manner in which they were designed was admirable, and very much on the same principle as those of Colonel Colt.

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1423. Are you aware of what they make a musket for at Toola?—I do not know.

1424. You are acquainted, are you not, with the works of the Ordnance, at Woolwich?—Yes, I have a general acquaintance, especially with the carriage department; I have been most concerned there.

1425. Are you also acquainted with the factories in the dockyard at Woolwich?—Not much; I had once to put up a steam hammer for them; I should not quote Woolwich dockyard as an example of economical production of machinery. In the steam factory, considerable economy is attained; but in other departments, when I saw it about four years ago, the smithy, or the forging department, was in a deplorable condition; I believe there have been considerable improvements made since then.

1426. Mr. *Monsell.*] Was that an Admiralty department?—Yes; it was before the introduction of a master smith, drawn from the private trade; since then there has been a most marked improvement.

1427, Lord *Seymour.*] When they went to the private trade, they improved their establishment, did they not?—It was understood that they went, for the purpose of improving their establishment, for a skilful manager, to private trade.

1428. Having seen the establishment of the Ordnance, do you think that little men brought in from the private trade would assist it?—I should say that, as to the carriage department, that I never saw a more efficient set of foremen at the head of any establishment. I should be very proud if my own factory was carried on in the same spirit as that was in the time of Colonel Colquhoun. I think that that establishment was quite an example, and I have many a time referred my own customers to go to see my own machines worked with the greatest perfection at the carriage department, especially the use of the steam hammer. I do not know any establishment that can compare with the admirable manner in which the use of that tool has been carried out in the carriage department, greatly resulting from the zeal of the foremen and managing man superintending it. It is a most exemplary establishment.

1429. Can you say at all whether you consider it economical?—I should say that it is highly so.

1430. Have you ever looked into it sufficiently to form an opinion as to the expenditure, and the results of the economy pursued?—I have seen returns. In fact Colonel Colquhoun has sent me from time to time returns of the savings made by the introduction of various improvements. I may state that I was called in by the Board to recommend what should be done for the purpose of substituting mechanical contrivance, instead of depending on manual dexterity. I drew up a report, and that report has been very fully carried out; and, without claiming any praise, I may say that the Colonel did carry out in the most gallant spirit all the suggestions that I made; and the large amount of savings I may really claim as the result of carrying out the recommendations of that report.

1431. You believe that there have been great savings?—I should say so.

1432. Have you ever seen an American musket?—No; I have seen Colonel Colt's revolvers.

1433. Mr. *Monsell.*] Have you seen a Russian musket made by machinery?—I have had the parts of one sent to me from Toola at the time we made the estimate. The parts were sent to me to see if the machines could be improved for the production of those given parts.

1434. Were those parts all finished that you saw?—They were finished in the best sense; what a mechanic would call the best kind of finish. I consider that a great deal of finish destroys the character of the work. It is like taking a fine carving, and rubbing it over with sand-paper till the sharpness and precision and truth are gone. Even in Colonel Colt's manufacture, after he had attained remarkable precision in the parts, in order to meet the views of the public as to burnish, gloss, shine, and sparkle, they were obliged to be set up to be worked with emery-paper, so that all the beautiful sharp corners that a mechanic would admire were rubbed away and rounded. In fact, the work attained the maximum of perfection up to a certain point, and beyond that, by applying the finish, it began to deteriorate very decidedly.

1435. Lord *Seymour.*] You stated that, when you went to Colonel Colt's, you saw a young lad who had been a butcher, managing four of the machines?—Yes.

1436. Did

1436. Did you ask him how long it required, after leaving his trade as a butcher, to make him an adept in managing those machines?—No; I could form an idea; some of my most valuable and skilful men come to me as agricultural labourers, and I have stood the ordeal of three turns out and conquered each time; and the most trustworthy men I have were originally agricultural labourers; people taken from the fields in my own neighbourhood.

1437. How long did it take you to bring the raw material of an agricultural labourer into a mechanic?—They had been going through a kind of an apprenticeship before that in serving as labourers in the shop, assisting in lifting heavy weights, and that so far initiated them into the use of tools; of course I select those that are the most intelligent, and in the course of one week I have them producing three or four times the amount of what a legal hand, as he is called, would be allowed to do. I will give the Committee one instance in particular: I have a machine for boring cylinders, a process that requires very great accuracy and care, and I found, after the cylinder was put in the machine and set to work to bore by self-action, that here was a man at 32*s.* a week standing by for nearly a week looking at the machine; the only trouble I had with him was, to give him something to do to keep the machine clean, and I thought the best way to keep him fully employed was to give him another machine to fill up his time, and he then said he would not do so. I said, "Why?" He said, "The club will not allow of it." "Very well," I answered, "the best thing that you can do is to walk out." I was very irritated with the reply, as it was given with a certain degree of sauciness, and I bundled him out of the place. I then took the very labourer who used to assist him in putting the cylinder into the machine, and I said, "Now you will have the charge of this machine, and the other that this man has refused to work; and for every additional machine that you manage I will give you an additional shilling a week." That man now manages six machines, and he has plenty of time to spare. That is only an example of many instances of the same kind in my own establishment; and it delighted me at Colonel Colt's to see men who had been butchers, bakers, and tailors, not because they had so been, but because they were steady, intelligent young men, or old, as the case might be, where there was a free opening given to them, able and willing to apply their intelligence to the accomplishment of a given result.

1438. You have greatly distinguished yourself by inventing machinery; when you have commenced with any new machine, has your first design always succeeded, or has it taken you some time to bring it to perfection?—The first design has carried out all the principles in a more or less successful manner, but from time to time little improvements suggest themselves, and those are added; but I may say that the most successful things that I have done in that way have come very nearly to perfection within a couple of months from the time that they were originated.

1439. If it was proposed to make this large machinery of which we have been speaking, have you much confidence that it could be at first brought to such perfection that it would answer all practical purposes?—Yes, I think so; there might be minor improvements added from time to time, but they would be minor matters; nothing like an entire overturning and remodelling of the machinery, if done by proper persons, with proper deliberation.

1440. You stated that if proper steps were taken, the estimate was sufficient; will you explain what you mean by proper steps?—A good deal depends upon the manner in which the work is contracted for, and the selection of the party who is to carry it out in whole or in part.

1441. Would it be advisable, do you think, to get some of the machines that are used in America, in order to see the state to which they have brought musket-making machines there?—I think, from what I have seen at Colonel Colt's, that their system of tool-making, and the manner in which those tools are contrived for the performance of a given purpose, entitle the American tools and machinery to receive our most attentive study and consideration. I did not inquire the prices of these machines. In those American tools there is a common-sense way of going to the point at once, that I was quite struck with; there is great simplicity, almost a quaker-like rigidity of form, given to the machinery; no ornamentation, no rubbing away of corners, or polishing; but the precise, accurate, and correct results. It was that which gratified me so much at Colonel Colt's, to see the spirit that pervaded the machines; they really had a very decided and peculiar character of judicious contrivance.

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1442. This machinery was almost entirely brought from America, was it not?—Yes, almost entirely.

1443. It has been stated that such machinery is made cheaper there than in England?—I cannot say as to that; I did not inquire the prices of those machines.

1444. Being acquainted largely with the manufacture of machinery, is it your opinion that machinery in general is made more cheaply in America than in England?—I should say so, they not having to depend upon skilled labour; and by means of systems of machinery producing many descriptions of work cheaper than we can do, to a great extent, and by avoiding unnecessary work, such as undue polish, and no ornamental parts.

1445. Do you think that a Government establishment for the manufacture of machinery would be more economical than an establishment carried on by a person who was consulting his own interest?—I would say so, as a general principle; but not if the system were carried on which has been in a great measure carried out, particularly in the dockyards: that of appointing workmen, not because they were skilful, but because they had some connexion with somebody or other that it was important to serve; the contrary would be the result.

1446. That interferes very much with the good economy and management of an establishment, does it not?—Yes; unless that is watched, and kept down, and ruled over, it would upset all your calculations of economy.

1447. Mr. *Muntz.*] You stated just now, that you turned a man away for his impudence and put another man in his place, he being unskilled, and you gave him several machines to attend to, which the other man refused to do. I suppose that was not the first time you had done that?—No.

1448. I presume you know that other people take that step oftener than they like?—No; I wish they would take it oftener.

1449. There was nothing new connected with that movement of yours; it was an old boring machine, was it not?—It was a boring machine of a very improved description.

1450. Then why did you not do so before?—I had been under the same ban as many are at this day; the most independent manufacturers, who would wish to do much in this way, but they are not allowed to do so by reason of the opposition from the workmen.

1451. Where is that so?—I should say in every establishment in this country; I have found it so.

1452. You have been speaking about the manufacture of guns; have you ever seen a gun made?—I have never seen it made in one establishment.

1453. But have you seen a gun made at all?—I have seen guns making in shops at Birmingham.

1454. Have you seen all the parts of a gun made?—No, I cannot say all.

1455. Have you seen the barrels made?—Yes, the barrels and the locks.

1456. And the bayonets?—No.

1457. Nor the ramrod?—No.

1458. If you have not seen all the parts of a gun made, how can you speak as to the possibility of manufacturing the whole by machinery?—The opinions I have formed from what I have seen, guide me, I think, as to all the rest.

1459. Whose manufacture of barrels have you seen?—I do not recollect the name of the party.

1460. In what part of Birmingham was it?—In the lower part of the town; I cannot specify exactly.

1461. Was it near the canal?—No; it was the Russian officer who came over about this estimate which I have described, who went to Birmingham to see what was the present state of the tools employed there, and he asked me to accompany him; and, without knowing the names of the manufacturers, I did go, and I was introduced to several workshops, but I did not know anything about the proprietors; I do not recollect the names of them.

1462. You cannot say whose barrel manufactory you saw?—No.

1463. Did you see any objection to the principle of rolling the barrels?—The principle was all right enough.

1464. Did it make the barrel a good one?—Yes, so far as I could judge at the time.

1465. Did you see them turn them?—No, they were ground.

1466. You

1466. You never saw a barrel turned?—Yes, I saw one machine turning a barrel, but not in a general way.

1467. You do not know that they are generally turned?—Some are turned and some ground; the finer description are turned, I believe.

1468. Do you know that those guns which are being made now for the Ordnance are all turned?—I am not aware of that.

1469. Did you ever see any barrel bored?—Yes.

1470. Had you any objection to that?—I was struck with the rudeness of the machinery.

1471. Can you tell me of any machine that will supersede that plan, and do it better?—I should say that by improved machinery and superintendence they could have done six or seven times the amount.

1472. By which process?—The boring.

1473. Do you mean the first part of the boring or the second part?—Yes; a man might as well have the superintending of a dozen barrels boring as a less number.

1474. Did the man you saw only superintend one?—I think there were only two.

1475. How many boring mills did you see?—Only one.

1476. Whose was that?—I cannot give you the names.

1477. Did you see the work when finished?—Yes, I did.

1478. What did you think of the inside of the barrel when finished?—I looked through it, and it looked smooth.

1479. Could you tell whether it was straight or not?—I could not say that.

1480. You are not able to tell whether a barrel is straight or crooked?—Unless I took proper means.

1481. What means would you take?—It would require very careful and accurate means, by preparing an absolutely straight edge, or by some suitable optical means.

1482. Could you put a straight edge in any barrel the size of a musket barrel so correctly, as to say whether it was straight or crooked?—I dare say I could.

1483. Perhaps you are not aware that the only way that has been yet discovered is by looking through it?—A practised eye may do wonders, but I should say that it is rather a dangerous thing to trust merely to the unaided sight.

1484. Are you aware that all the finest barrels that are made for sporting, and sold at very high prices, are solely and entirely bored by the eye?—I am surprised to hear that; I am surprised that such a rude means is resorted to to ascertain the correctness of it. Query, after looking through it, is it straight?

1485. It is straight enough to shoot straight?—I should say, that to trust to the unaided eye in ascertaining the absolute straightness of any mechanical structure, was trusting to a fallacious means.

1486. Have you any knowledge with respect to the outside of a barrel; do you know the form at present required for the outside?—Not precisely; it is a peculiar curved line.

1487. Do you know the best way of obtaining that line?—I know that there are machines contrived to get any contour that is desirable.

1488. Taking the substance of the present Minié rifle, and putting it in a lathe, do you think that you can turn such a rifle perfect as to form outside, and perfectly straight inside?—Yes.

1489. Have you tried it?—No, but I consider it quite possible and practicable.

1490. You did not see any barrel turned at all?—Yes, in one instance, if I remember right.

1491. Did you examine the barrels as to their quality in any way?—I was not at that time very particularly interested in the matter; being only a visitor, accompanying this other gentleman; I had not an opportunity.

1492. How long ago was that?—I think it was in the year 1849 or 1850.

1493. Then you have not been in contact with barrel-making for the last five years?—No.

1494. You do not know what improvements have been made since then?—No.

1495. Did you see any locks made?—Yes.

1496. Where?—At Messrs. Braziers, at Wolverhampton.

 1497. Were

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1497. Were any parts of the lock stamped?—Yes, in the same way as I have explained; I have lately supplied Messrs. Braziers with some of the machinery.

1498. Then according to that, if Messrs. Braziers can make those stamped articles, where is the necessity for the Government stamping them?—They ought to adopt the stamps, and they are, I dare say, being adopted.

1499. You have a convincing proof, have you not, that an individual may stamp as well as the Government may stamp?—Yes.

1500. Do not you think that an individual can stamp if the Government can?—Yes, I suppose so, if he takes the right means, but they have not taken the right means at present; I may, without a breach of confidence, state, that I was conversing a few minutes ago with Mr. Brazier, who says that he is controlled in adopting those improvements by the state of the men.

1501. Does not he use those stamps?—He has just commenced; scarcely that.

1502. Before he used your stamps, did he not stamp by hand?—Yes; the stamp has been long employed in the gun trade.

1503. What do you suppose would be the difference of cost between Messrs. Brazier's work as stamped by hand, and that stamped by your machinery?—I should say that it would cost one-third.

1504. How much would that be in a gun?—I cannot say.

1505. It would be very trifling, would it not?—No; it is not merely that you economise in the process, but you produce such an identity in the articles that they cost less in finishing.

1506. Will there be any difference in the identity of the stamp, if the mould is the same?—A stamp properly constructed gives them with more precision.

1507. It is the same mould, is it not?—The blow is more precise.

1508. Supposing the weight sufficient to do it, would it make any difference whether that weight was elevated by hand or by machinery?—Of course, in that case the result is the same; it does not matter what is the motive power, except that by employing steam you obtain all varieties of intensity of blow as well as great rapidity, which hand-worked stamps cannot effect.

1509. You have stated that the Russians make their guns by machinery; do they make stocks by machinery?—I believe so.

1510. Have you seen them?—No.

1511. Do they cut up all the parts of the castings for the locks by machinery?—Yes, every bit of them.

1512. Similar to Colonel Colt's machinery?—Yes.

1513. When they have cut them up, do they do no other work with them afterwards?—I have never seen a finished gun-lock; I have seen them as they come from the machine.

1514. Do you suppose that those parts that come from the machine would be fit to put together in the state they are?—Yes.

1515. Do you think that they are so put together?—I cannot say positively.

1516. Does Colonel Colt put his parts together in that state?—No; he passes them into what they call the finishing-shop.

1517. Does he do nothing else but that?—I do not know that he does any thing more.

1518. Did you not see a bench, with men filing all along it?—I saw comparatively few men.

1519. How many did you see?—I cannot say the number.

1520. Did you see a score?—I dare say there were.

1521. Were not those men filing up the work after it came from the tool?—Yes.

1522. Did they not put a number upon every single piece of work that they filed?—Yes; and they were so marked to be transferred to the storekeeper.

1523. Afterwards they were sent to the polishing-room, were they not?—Yes.

1524. You saw that done?—No.

1525. Are you sure that any quantity of those materials so cut up by Colonel Colt will fit into one another?—I should say that the means which he employs would attain that object.

1526. Did you see them tried?—We had several of them weighed together, to ascertain the precise quantity in each, and they were remarkably precise.

1527. Do not you know that a very small difference in the machine prevents one fitting into the other?—Yes, but he had a testing machine, to test in every case,

case, whether the part so produced by machinery was brought to the exact size that it ought to be; that was a remarkable part of the system, those criticising machines: little instruments that were in each department, and the part, whatever it was, was placed in different directions, with gauging parts that came over it, and they could detect the one-thousandth of an inch difference; and in order to keep this machine perfectly correct, he had a duplicate testing machine kept in store as a standard to refer to, in case of the workmanship of the shop standard getting out of order.

1528. The same as every man who manufactures himself keeps a set of weights to compare his weights with, instead of gauges; there is nothing new in that?—It is the first time that I ever saw it applied to mechanism to the same extent, and in such perfection.

1529. Were there any machines in that establishment that you had not seen before?—I had seen the principles of those machines; there are very few principles in all the machines employed.

1530. Did you see any that were new to you?—Yes; I should say that the process he adopted for rifling his pistol barrel had motions in it that I had not seen before.

1531. Do you know the cost of those machines individually?—I do not know.

1532. If you do not know the cost of those machines, how can you possibly make an estimate of the number of machines, and the cost of them, which will be required to make the guns wanted by the Government?—I can form an eye estimate when I see machinery before me; if I was asked what I would make another for, I could tell you within a narrow margin.

1533. Do you know how many are wanted to do the work?—Not the absolute number, but I could form a general idea of it without going into minute details.

1534. Have you formed a general idea of the number that will be wanted?—Yes.

1535. Do you know the number of arms that the Government propose to make?—Yes, 500 a day.

1536. How many machines do you consider will do that?—I could not give the exact number.

1537. Have you ever reckoned them up?—I have looked at the amounts in Mr. Anderson's notes.

1538. He has not so correct an account of that?—Yes; there is the number of machines put down, and the amounts placed opposite them.

1539. If you have not the cost of the machines, and the number, I do not think I can place much confidence in your estimate, that a certain amount of money will produce a certain effect?—£150,000., as it appears to me, would be a very liberal sum to erect the buildings and supply the machinery; if I was going to make the contract I would go more carefully into it.

1540. You cannot tell how much machinery, or the cost of it, which will be required to do this work?—No, not with precision.

1541. You have stated that it will get to work in 18 months; do you mean that the machinery will be in its place fit to begin to work, or so fixed and so worked upon, that the whole machinery will be fit to go off at score?—I should say, that in 18 months the establishment would be fit to commence business.

1542. Have you ever erected an establishment of that extent with similar complicated machinery, which has been in 18 months fit to go off at score?—I cannot say that I have.

1543. Do you know any one who has ever done so?—I cannot give an instance of that; I have seen great works carried out with great energy, both mechanical and other kinds, even within the time specified.

1544. To the same extent and with the same complicated machinery?—Yes, I think it might be done.

1545. In what line of business was that done?—I have not seen any parallel case, with the same kind of machinery in it; but in spinning and weaving establishments, I have.

1546. You were speaking of the men that you saw at Colonel Colt's; I went through that manufactory, and I examined those men myself; I have my own opinion upon it; but do you mean to say that the whole of the men at Colonel Colt's are of the description that you have given the Committee?—Not the whole.

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1547. Do not you think that there are many who have been at work for 30 or 35 years at the business they are employed upon?—A few of the superintending men may be so.

1548. Do you call the general mass of the men stupid and unskilled?—No, not stupid; anything but stupid.

1549. Do not you call them a very intelligent and active set of people?—Yes, I should say so by their appearance; they are exceedingly well-selected men, whatever may have been their origin.

1550. Do you think, speaking as an engineer and a manufacturer, that such men as those in Colonel Colt's factory could be taken from the plough-tail, and in 12 months be made what they are?—Yes, I think they could if they were selected with judgment, even from the plough-tail.

1551. You stated that some of those were experienced men?—Yes, possessing the requisite kind of experience.

1552. Taking them as a whole, do you believe that within 12 months any man could, for such work as they are doing now, obtain a number of men from the plough-tail, and make them what they are?—Yes; I should say that from the streets of London you could do that.

1553. Did you ever do that?—Yes, in part. You must have some guiding men to initiate them.

1554. Did you ever take a number of men from the streets, and put them to those machines, and bring them to the condition in which those men of Colonel Colt's are?—I have never done it to the extent that it is done there, but I consider, from what I have seen done, that it is quite possible to do it.

1555. Do you know anything about the wages that Colonel Colt pays?—No.

1556. You did not inquire into that, did you?—No.

1557. What should you think he pays?—I believe he pays according to merit: there is no standard of wages among the men. The leading men, I dare say, get very good wages.

1558. Did Colonel Colt tell you what he paid them?—No.

1559. What should you give the best men there?—I should give the leading men 2 *l.* 10 *s.* a week.

1560. Do you think that any man ever increased the wages of his servants in 12 months from 2 *s.* to 8 *s.* a day?—No, not that class; but the butcher, and the tailor, and those lads were, I suppose, not getting above 2 *s.* or 3 *s.* a day.

1561. Do you know what the women were getting a day?—No.

1562. Do you think that the lads, as you call them, though they are 19 or 20 years of age, began at 2 *s.* a day, and in 12 months became worth 50 *s.* a week?—No, he had no occasion to raise them up to 50 *s.*; he may raise a few up to 50 *s.*

1563. Do you think that any man would bring them up from 2 *s.* a day to 50 *s.* a week, in a year?—Yes, I think he might, to encourage very meritorious and skilful men.

1564. Did you ever do such a thing in your life?—No, I had no occasion to do it to that extent; but I have raised the wages of men from 18 *s.* to 30 *s.* within a year.

1565. You still believe that the work is done to such nicety, that if the whole of the materials were mixed together in a heap they could be taken and put together?—Yes.

1566. Did you ever see it tried?—No, but from the principles which I saw at work, I should say that that was the object, and that the result would follow.

1567. Without more labour than is now bestowed upon the parts?—Yes; the fitting parts were all the result of the machines, and perfect as they came from the machines.

1568. For example, the cocks and the locks, did you not see that they were all filed?—That was merely to take the tool marks off them.

1569. Is there not a great deal of labour and care required in working with those machines; for instance, as soon as a certain quantity of work is done by a machine, to see that the tool does not vary in size, so as to alter the size of the article?—Yes, and hence the use of criticising machines. If the operative has a standard article beside him, from time to time he can apply his gauges, and see what the progress of the work going on is, and he may detect anything that is wrong at a very early period.

1570. With regard to the pistol of Colonel Colt and to the Minié rifle now being

being used by the Ordnance, which you have seen, have you made any comparison between that rifle and Colonel Colt's pistol, as to the quality of the work?—I should say that Colonel Colt's pistols were of superior workmanship.

1571. Have you proved that?—No; but I know the principles on which they are made; and I have seen such parts of the gun as give me a very fair idea of all the rest.

1572. Are you sure that Colonel Colt's pistols are straight inside?—If they are not, I do not know how they will ever be made straight.

1573. Are you sure that they are straight?—Yes; I should say by the means that he employs they must be; he takes the most perfect and accurate means.

1574. Do not you know that the way in which he finishes the boring is precisely the way in which guns are bored in Birmingham?—Yes.

1575. Then of course the barrels ought to be as straight in the guns as in the pistols?—Yes.

1576. Is not it more easy to make one of Colonel Colt's barrels than to make one of those Minié rifle barrels?—Yes, in the ratio of length.

1577. You state that you have not looked at the outside of one of those barrels?—No.

1578. Do you know the condition in which the Ordnance require those barrels to be delivered to them?—No.

1579. Did you ever look at one?—No.

1580. Colonel *Dunne.*] You state that the pieces produced by machinery could be thrown promiscuously together, and put together without filing. Suppose them taken into the field and one part was broken, could you supply that without any filing?—I think I could.

1581. Do you think that the machinery used by Colonel Colt is applicable to muskets?—Yes.

1582. Do you not think that private persons could put up the same machinery that is proposed for the Government?—Yes, of course.

1583. Do you think that the Government could depend upon that chance, or that they would be able to insure the quantity of muskets they required?—They would need to ask the Trades' Unions if they would allow them to adopt them.

1584. Do you think that it would be advisable on the part of the Government to trust to that contingency?—Not at present.

1585. You do not think that the Government ought to trust to that contingency?—No.

1586. Therefore it would be wiser on the part of the Government to establish a factory of its own?—Yes.

1587. You stated that in Colonel Colt's manufactory there were several men filing the different parts?—They appeared to be filing the ornamental parts.

1588. Do you remember whether the greater part of them were not employed in filing the different parts of the machinery itself, and not the pistols?—No, that did not impress itself upon me; he had a separate department for that purpose; he had a set of men kept for keeping the tools in order.

1589. Were not very many of the men who were employed in filing employed for that purpose?—I was most attracted by the operation of the machines; I cannot say.

1590. Mr. *Muntz.*] You know Mr. Mitton, in the Potteries, do you not?—Yes.

1591. Have you not been employed to make a machine for him to make bricks?—For making tiles.

1592. How long since was that?—About two years ago.

1593. How does it work?—The machinery is not perfect.

1594. Has it ever been at work?—Yes, several times.

1595. Has it ever done anything satisfactory?—It is only experimental at present.

1596. Why does it not go on?—I do not know.

1597. Did he ever complain of it?—It was the first experimental machine.

1598. Did he ever complain about its not working?—No; several parts of it have required modifying.

1599. Has he paid you for it?—Yes, long since.

1600. And he never made any complaint of it?—No; it is considered to be very satisfactory and encouraging, and he is now talking of having another one to embody all the improvements suggested in this experiment, and to have a more powerful one.

 1601. Has

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1601. Has not this machine failed altogether?—Certainly not; it was only the other day that his partner, Mr. Hollins, was with me on that very subject, speaking most highly of the results of the machine; that it had attained all that they had expected, but they found that it was somewhat deficient in strength. I state the facts.

1602. Mr. *Geach.*] Is it not within your experience that there has been a continual progress going on in the adapting of machinery where hand-labour was applied before?—Decidedly; that is the character of the present day.

1603. And that the true interest of all parties is to adapt machinery to supersede hand labour?—It is.

1604. You have found, have you not, that it has been adopted by slow degrees in other trades?—Yes.

1605. Is it not, within your knowledge, from the progressive improvements that have gone on, in the cotton trade, for instance, that the cotton trade did not from hand-looms arrive at its present state of efficiency at once?—No.

1606. It was not the invention of one person that brought the cotton trade to its present efficiency?—No; it has been the combination of intelligence and ingenuity continually striving against obstructions, mainly resulting from the opposition offered by the working classes themselves.

1607. And they have succeeded in the end in making it as efficient as it is now?—There is a vast deal done; but it is very much less than what might be done if those obstructions were removed.

1608. Do not you suppose that there is the same interest in the gun trade as there is in other trades to adopt machinery, and to employ capital in the production of machinery?—If the gunmakers took the right view of their business, they would adopt such improvements; but so far as I know, they have not adopted up to this time those improvements that have aided us so importantly in other departments of manufacture. I would not quote the gun trade as an example of manufacturers availing themselves of the latest improvements of the day.

1609. If you found that all the customers of the gunmakers, instead of offering facilities to articles being made by machinery, were throwing obstructions in the way of those articles being made by machinery, would you not say that that must have tended a great deal to prevent the adoption of machinery by the trade?—I do not know why it should have that effect; the adoption of machinery is desirable for the purpose of securing perfection and economy, and I do not see why, if there is a sufficient contract given out to a gunmaker, that would warrant by its extent his adoption of mechanical improvements, he should not do it, simply because it was a Government order.

1610. If, for instance, in giving an order for a gun, that order was divided into six or seven parts, and the parts were brought together, and then given out to a man to set up, would not that be a great obstacle to capital being employed in the most beneficial manner for the production of the gun?—Decidedly it would be a great discouragement.

1611. What reason have you in particular for saying that the Government would be better able to carry out those improvements in gunmaking than private enterprise and capital?—Because I think there would be a unity of design in the whole establishment; it would be pervaded by one spirit, and one system of government in it, and there would be one object in it, and the whole thing combined in one great establishment; and where there would be a succession of operations following one another in the right course, there would be material economy and perfection of result.

1612. Do not you think that there are advantages on the other side, in the division of labour?—There are great advantages in the division of labour, no doubt; but I do not consider it dividing labour, to make locks in one part of the town, and barrels in another; that is not dividing labour, in the right sense.

1613. But you have competition there, where many people make the same thing?—Yes; but I think it a very bad principle to take a machine to pieces, and make one part in one establishment and another in another. If we made steam engines on the same principles, the piston made at one place, the cylinder at another, and the boiler at a third, I should say that it would be very likely to be defective, from the parts not agreeing.

1614. If you went into Staffordshire to buy iron work, and you manufactured the parts of a steam-engine in Manchester, would not that be an economical mode of proceeding?—It is only done when there is a specialty in the part required.

required. In the case of locomotive engines, the practice is to have the brass tubes for the boilers made at Birmingham, because that is the seat of the brass manufacture, and the most skilful men are there; but if a manufacturer could have equally skilled men, and equally complete means at Manchester, for instance, in Mr. Sharp's establishment; if he had the same means of making brass tubes, and the same men in his own establishment, I should say it would be better for him to do so. If Mr. Sharp wished to produce the most perfect locomotive at the least expense, he should do every portion in his own premises, and under one system of control.

1615. He would require, would he not, to have a mill forge to make the iron? —Yes; he is gradually getting into that.

1616. Would you advise him to go further, and have a blast furnace?—No; common sense and judgment will dictate the limit. I think you may carry any good system to absurdity by overriding it.

1617. Is it not the case that the cotton trade is divided now, and that the spinners are often in many cases spinners alone, who sell to the men who weave the cloth?—Yes.

1618. That subdivision has been found to be profitable, has it not?—I do not say that; the largest and best conducted establishments do the whole; there is the case of Dugdale Brothers, perhaps the largest calico printers in the world; they spin the cotton, weave it, dye it, and go through every process of bleaching; and every process is conducted from the bag of raw cotton to the bales of manufactured printed goods.

1619. Still a very large trade is carried on in the other way, and it answers? —Yes, it answers; not because of that system, but in spite of it.

1620. It keeps its ground?—Yes; for the demand is so great that there is a margin of profit that will allow for a good deal of bad management; the cotton trade is so lucrative, and a proprietor makes a good profit in the end, not made because of that arrangement, but in spite of it.

1621. Supposing the Government were to set up an establishment for making cloth for clothing the army, would it be desirable for them to have an establishment to make it themselves, or to depend upon private manufacturers?—If they could get a first-rate cloth, which they could have made in separate parts of the country, one competing against another, I should say that it would be undesirable for the Government to have their own manufactory; but that is supposing that they could have an article made in perfection; and if they could, I should say, "Do not establish your own manufactory."

1622. Mr. *Newdegate.*] I would ask you whether the principle which you have stated as applicable to the production of cloth, and which you object to the Government manufacturing, is not equally applicable to the production of guns?—If we had private establishments in this country fit to produce perfect guns, and those as rapidly as emergency may require, then I should say that no reason remains why the Government should produce their own.

1623. You stated, did you not, that you thought the present system of Government contracts for the several different parts of the musket, instead of contracting for the complete arm finished, an extremely absurd system?—Yes, I think it must result in confusion.

1624. Would it not, in your opinion, by dividing a contract, and giving each party less to do, give a greater opportunity for strikes to operate against the completion of the work?—I think if one contractor was to equip his establishment with proper tools and machinery, he would be very nearly independent of all strikes and turns-out whatever.

1625. Which cannot be the case under the system of separate contracts?— Certainly not. The more you sub-divide, the more you are at their mercy. Any defect in the links of the organisation for the production of any particular article, or the more you sub-divide the links and spread them over different hands, the more you are liable to be checked by a turn-out of the men.

1626. You consider that this system of dividing contracts has been an impediment to the trade of Birmingham, by exposing them to the operation of strikes and combinations?—Yes, decidedly.

1627. You have here submitted the forms of parts of a musket stamped by machinery?—Yes.

1628. Are the Committee to understand that no manual labour is to be applied to finish them, that is, to reduce them to their final forms?—With pro-

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perly contrived machinery you might reduce the employment of manual labour, I may say, down to zero; there might be some little touches here and there by manual labour, that would depend upon the skill of the manager of the establishment; but by adopting the means that have been adopted so far, and applying afterwards proper mechanical contrivances to complete and finish this article by machinery, I think you would reduce the necessity for manual labour down to zero.

1629. Has that ever been done?—Yes.

1630. In the construction of muskets?—I cannot say as to muskets.

1631. But you suppose that there are analogous cases?—Yes.

1632. What do you take as analogous cases?—The case of Colonel Colt's revolvers is a most perfectly analogous case.

1633. Do you maintain that in that case manual labour has been entirely superseded?—Not entirely.

1634. After those parts have been completed, first by the stamp, and then by a certain application of manual labour, is it not necessary that some of them should be hardened?—Yes.

1635. Is it not impossible to avoid the metals casting in that process?—They do cast or twist occasionally.

1636. How must that casting be cured?—By slightly warming the part, and either striking it with a wooden mallet or a screw press.

1637. That must be done by manual labour, must it not?—Yes; but the amount is very small.

1638. If that were not done, you would not anticipate that exact fitting of the parts, that is of the iron to the wood, which you believe to have been attained in Colonel Colt's manufactory?—Certainly; but that adjustment after a case-hardening would be common to the parts, whether done by hand-labour or done by machinery.

1639. Mr. *Muntz.*] With regard to the making of the barrels which you saw made in Birmingham; did you see anything whatever in the making of them that is not done by machinery that could be done by machinery?—No; I do not know that I did see anything but what could be done by machinery.

1640. Do you consider that a barrel is altogether made by machinery?—No; but the necessity for manual labour might be reduced very considerably below what is done at Birmingham.

1641. In a barrel?—Yes.

1642. In what part of it?—Squaring up the octagon of the ends; it appeared to be filed.

1643. Supposing there is no octagon?—Then it must be done in the turning-lathe; still the parts of the nipple must be got round.

1644. Supposing that to be done by machinery now, what more would you want?—There would be very little then left.

1645. Then you could not increase the quantity of machinery used for the barrel?—I cannot say. I dare say I could find out some further application of machinery to the barrel.

1646. What for?—For fixing the sights and nipples.

1647. That is done by machinery now. Perhaps you would like to make the pin by machinery?—That is made by machinery.

1648. Do you know that a great quantity of locks, or nearly the whole of them, are stamped already?—Yes; I dare say they are.

1649. You do not know anything about manufacturing ramrods?—I have not seen it.

1650. Have you ever seen one?—Yes; I believe they are rolled.

1651. With that large swell in them (*pointing to a ramrod*)?—Yes; it is possible to roll them with a swell in them.

1652. Of the same form as this?—I do not see anything in the shape of any ramrod that I have seen that could not be done by machinery.

1653. Mr. *G. Dundas.*] Have you examined this probable estimate of the cost of the manufactory?—I have just cast my eye over the items.

1654. You think that 150,000*l.* would make it, and cover all expenses?—I think that it is an ample amount of money.

1655. I wish to call your attention to one item, the second one, "two condensing steam engines," the price of which is stated in the estimate at 4,500*l.*; you will remember that, in Colonel Colt's manufactory, all his machinery is driven

driven by two high-pressure engines of 10-horse power each; do you not think that it would be quite as efficient to have several high pressure engines of that size, instead of those two large and very expensive engines, and which would materially diminish the cost?—I think that that item might be very much reduced by that system. I think, as a general principle, that it is not desirable to trust to one located power for all your motive power, as if anything gives way it paralyses the whole establishment.

1656. Then you would probably have a small high-pressure engine upon every floor in different parts of the manufactory?—When it could be judiciously applied; it would require to be done with considerable judgment; it is a good principle, but it is capable of being carried out too far. I am a great advocate for dividing the motive power, and not trusting all to one engine.

1657. Mr. *Muntz.*] Will you just look at that ramrod (*handing the same to the Witness*)?—Yes. I see nothing here that could not be done by very simple machinery.

1658. Supposing that there are already the iron and steel in it, how would you do it then at those shutts?—I would weld it at those shutts, and have it brought to the precise form by suitable machinery afterwards.

1659. Do you know whether it is made by machinery now or not?—No, I have not seen this made.

1660. To what part are you going to apply this great increase of machinery in the manufacture of guns. You say that all machinery ought to be used that can be?—There may be machines employed for doing various part of guns now, but it does not appear to me that the application of machinery is carried out on that extended scale that would attain the utmost perfection, and reduce the cost at the same time.

1661. Having seen very little of gunmaking, you cannot say to what extent it is carried now?—A gun is a piece of mechanism; there is nothing very peculiar about the parts of a gun, and the knowledge that enables one to make a steam-engine should enable one to form an opinion upon it.

1662. Where is the additional machinery to be employed that is not employed already on the article?—Then I should ask why are the gunmakers of Birmingham so much at the mercy of their men; if they have that quantity of machinery that I think is applicable to gunmaking, they ought to be quite independent of those men, and not be knuckling down to them as they are, and not consulting whether they should adopt such and such improvements, and whether their men will allow them to do so. I may quote Mr. Brazier as having given me that information.

1663. What account did Mr. Brazier give you?—That he has been tormented out of his life by his men striking.

1664. When did he tell you that?—Within the last hour.

1665. Have no men been striking in your part of the world?—Yes.

1666. Then you have not obviated the striking by your machinery?—We have reduced it so much, that we are far less dependent upon the men.

1667. You will not say that there has not been very extensive and fearful strikes going on in Lancashire?—No; but it would be still more fearful if there was no machinery; as a general principle, I say that the introduction of machinery is the best check possible against strikes.

1668. Where is the great advantage that you are to derive from the application of machinery to making guns?—I should say that there might be a very great increase in the application of machines.

1669. To what part of it do you refer?—Throughout all the parts. If I wanted to see the greatest application of ingenious machinery for economising labour in the manufacture of any article, I should certainly not go to Birmingham. So far, judging from what I have seen, I should say that they were very far behind the day, and very far behind other branches of manufacture in the adoption of machinery.

1670. You stated just now that you thought it was more advantageous that all the parts of a gun should be made by one person, one establishment; is that the practice throughout the trade generally?—It is the great object to be aimed at.

1671. What is the reason that every house builder does not make his own grates, locks, and bells?—The first house builder does do so, viz., Mr. Cubitt; he is a very remarkable instance.

 1672. Are

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1672. Are you sure of that?—Yes, I have seen it. Mr. Cubitt is considered to be the most perfect house builder in the world; and if there is an establishment where system has been introduced to economise labour, and at the same time keeping himself quite independent of the strikes, it is Mr. Cubitt's. He makes his grates and bell movements by machinery, with the very best tools that he can get.

1673. How long has he done that?—Eight years, and he saves enormously by it.

1674. I suppose you will admit that in making guns there are many trades concerned, band-makers, ramrod-makers, barrel-makers, lock-makers, and stock-makers; those have been separate trades for hundreds of years?—But why? It is like making the doors of a house in one part of the town, the window-frames in another, and the floor in another.

1675. No; they are all made of one material. You think, do you not, that the man who makes all those articles in one establishment, must necessarily make them more cheaply than in any other way?—Yes; decidedly.

1676. You think that a man who works in wood, and a man who works in iron, and a man who works in brass, must necessarily be equally competent in all those different branches?—If he can get men; if he has sufficient capital to bring them all together into one establishment, that man will be able to enter the market and undersell the man who makes an article by scattering the parts among different persons working in different and detached establishments.

1677. Will he not have to pay for superintendence in every separate trade?—No; he will have managing men.

1678. Is not that superintendence, and does not that cost money?—Yes, but he saves the profit of the little masters; for instance, if you make the barrels of a gun under one master, and the locks under another, you have two profits to pay instead of one; two masters to pay, and two proprietors of establishments. It appears to me that you would show that large establishments are worked with less profit than small ones. Now, if a large establishment, so far as I know, is organised in a proper way, it is because of its largeness admitting of a complete introduction of system throughout, and a more improved means of obtaining the various parts; it is for that reason that the proprietor of such an establishment will make the greatest profit.

1679. Mr. *Monsell.*] Are the Committee to understand you to state distinctly that you conceive that the present Minié rifle, without altering the form of any of its parts, could be made altogether by machinery?—Yes, from what I see of it, machinery might be introduced to execute the parts, and that would reduce the dependence on manual labour to zero.

1680. What machinery would you employ to finish the guard in its present form?—I should employ a cutter machine of a peculiar construction that would produce a certain varying contour in which the curves were constantly varying, and yet the whole machine performing by self-action.

1681. What kind of machine would you employ to make the hammer in its present form?—I would use for that purpose the same principle of machine as Mr. Jordan employed for doing his carvings; in the way that the dies of the Mint are sunk; the machine that copies off the original medallion, and transfers it from the cameo into the intaglio, or the reverse; there is contrived a machine that I think is eminently applicable to execute the present form of the hammer of the Minié rifle.

1682. You have no doubt that machines could be made which would produce those parts exactly in the same shape as now, without difficulty?—Yes.

1683. Colonel *Boldero.*] Did you ever see a bayonet made?—No.

1684. Do you think that machinery could be made so as to make a bayonet of one piece whole and entire, which is now made in two parts?—Yes, I see no difficulty.

1685. Without altering the shape or the mode of fitting it on to the musket?—Yes; I think that it is possible to invent a machine for that purpose.

1686. Mr. *Newdegate.*] Have you ever seen machinery applied in the manufacture of bayonets?—No, except that I have seen the designs of the machines that were employed at Toola for that purpose.

1687. You have not seen the machines at present employed in England for manufacturing bayonets?—No.

1688. Do you know that such means are employed?—I am not aware of that.

1689. As to the Minié rifle, you state that to the whole construction of the Minié rifle you think machinery might be applied, until it would reduce the manual labour to zero?—Yes, decidedly.

1690. Has that ever been done?—Not that I am aware of, but I think it is quite possible.

Mr. *George Wallis*, called in; and Examined.

1691. *Chairman.*] WHAT is your profession?—I am the Head Master of the Government School of Art at Birmingham.

1692. Are you acquainted with factories in which machinery is employed?—I am generally acquainted with manufactories.

1693. Have you any acquaintance with the present state of the gun trade in this country?—A general acquaintance, obtained recently from having visited the various manufactories at Birmingham, or at least a portion of them.

1694. Would you have the kindness to describe the state of the gun trade in this country?—I visited several establishments; for instance, those in which barrels were produced, and locks, and in which portions of the fitting-up were done; and in looking carefully over them I found, upon comparing the system with that pursued in other manufactures in this country, that it appeared to be in a somewhat rude and primitive state of development. There did not appear to be that amount of mechanical ingenuity employed that might have been employed, and that certainly had been applied to my knowledge to equally difficult manufactures. I found that the barrels, as I have said, were made in one factory, and that they had to be carried to another to be finished; in others, again, the locks were made, and the fitting was done elsewhere; the whole system appeared to be rude and unsystematic.

1695. You have lately been in the United States of America, have you not?—Yes, I was there last summer.

1696. What was the object of your visit to the United States?—I was deputed as one of the Commissioners to visit the New York Exhibition.

1697. Did you, when there, visit any manufactory of small arms?—I visited the State Armoury, at Springfield, in Massachusetts, and the factory of the Massachusetts Arms Company at Chicopee, in the same state.

1698. Will you give to the Committee a general description of the effect that was produced on your mind by the state of this manufacture of small arms, as compared with the state of the manufacture of small arms in this country?—I may state that, in visiting those manufactories, I did so, not for any special purpose; that was distinctly out of the routine of the object that took me to the United States; but at the same time, as a general observer, I visited the two manufactories, and I certainly was very much struck with the system of order and regularity, and the immense amount of ingenuity displayed in the machinery used at Springfield, and also at the other manufactory. The general character of the work appeared to me, not speaking professionally, to be good, and the character of the operatives, so to speak, shewed a high order of intelligence; the machinery shewed extreme ingenuity, and it appeared to do its work thoroughly well.

1699. From your knowledge of manufactures, are you of opinion that any benefit would result to the gun trade from the introduction of machinery similar to that which you saw at Springfield?—I cannot doubt it at all.

1700. What parts of a musket are made by machinery at Springfield?—The whole of the stock is manufactured from the rough stock by machinery, and the chief portions of the locks. All the fitting parts are done completely by machinery; but there are portions of the lock which, to the best of my recollection, are filed; but that did not apply to the fitting parts of the lock, for the whole of the fitting parts and those of the stock were made perfectly from the machine from the rough-sawn stock. I did not visit the barrel factory or the rolling-mill, because that was two miles from the Armoury; they did not make the barrels on the premises, but they are now erecting a place for the purpose of having the whole of the forging and other operations conducted together. I understood that it would be useless for me to visit the rolling-mill, because they said the operation of barrel rolling was very similar to the Birmingham method;

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in fact, they stated that they were not aware that it differed from that which obtained in England generally.

1701. You say that some portions of the lock were filed?—Yes, but not the fitting portions; for instance, the upper part of the striker was filed. Those portions that fitted into the lock upon which the striker moved were milled by machinery, and were, I think, not filed; other portions were filed; but so far as I can remember there was a considerable portion of the striker, and the curves, for instance, that were worked out by means of mills instead of files. Of course, the form was adapted to the action of the tool, the curves of the striker probably were not precisely the same curves as the striker belonging to the Birmingham musket. Again, there were other portions of the lock in which curves were used, in which circles adapted to the action of the tool were introduced, instead of the forms being hand curves, or ellipses.

1702. Do you state that the various portions of the lock fitted without filing?—Yes, in a general way.

1703. What do you mean by that?—That is, they might use a file upon a little point here and there, to smooth off any slight edge that was left; but generally, I think, the whole of the fitting was done by machinery.

1704. So that any one part of a lock would fit in the corresponding place any other lock?—I am not quite clear upon that point; I did not see the lock put together, but I think that the whole of the limbs, as they are called, of one lock, did fit into any other lock of the same size and construction.

1705. Did you see any rifles made by machinery?—Not at Springfield, but at the manufactory of the Massachusetts Arms Company, at Chicopee.

1706. Was that a private factory?—It is a joint stock company, and is a rifle factory and a revolver factory.

1707. At the private factory that you visited, were muskets and rifles made by machinery to the same extent as at the Government factory?—The place was not so large, but machinery was used to the same proportionate extent, though I do not remember seeing stocking done by machinery at the Arms Company's manufactory.

1708. Do you see any reason why similar machinery should not be introduced into this country to manufacture fire-arms?—I see no reason.

1709. If such machinery were introduced into this country at once, would it produce a considerable quantity of fire-arms?—If extensive experiments were about to be made for the purpose of constructing similar machinery without being precisely the same, then I think that a great deal of time would necessarily be lost in those experiments; but if you get the same machinery with the same intelligence that I saw at Springfield, I see no reason why it should not be done as well in England as at Springfield.

1710. Do you consider that the machinery for making fire-arms has reached a considerable degree of development in America?—Decidedly.

1711. And, therefore, starting in this country from that point which they have reached in America, you would commence with great advantages?—I should think so.

1712. Mr. *Walpole.*] I believe that the factory at Springfield is a factory belonging to the Federal Government?—To the State Government.

1713. But the factory at Chicopee belongs to a company?—It does.

1714. At Springfield, you state that only parts of the gun are made, viz., the stock and the lock; the barrel is made in a different place?—The barrel was made at the rolling-mill, two miles as I understood, from the armoury, but is under the same superintendence.

1715. At Chicopee, are all the parts of the rifle made by the same establishment or not?—The different parts were all made at the same establishment; every part of the gun or rifle.

1716. You stated, did you not, that the State Government of Massachusetts were thinking of making the barrels, as well as the stock and the lock, in the same establishment?—They are about to do so.

1717. Were any reasons given to you by the official authorities for the change which they were going to make in that respect?—They thought that the superintendence would be more complete by having the rolling-mill nearer to the present manufactory.

1718. Lord *Seymour.*] What office do you hold?—I am the head master of the Government School of Art at Birmingham.

1719. How long have you held that office?—A little more than two years.

1720. Before

1720. Before that were you concerned in manufactures at all?—I was some years ago the head-master of the Manchester School of Design, and have been more or less connected with manufactures, and observing them, for the last 15 years.

1721. As master of the School of Art at Manchester, you were well acquainted with machinery necessarily?—Not necessarily; but taking a great interest in all industrial developments, I have paid great attention to the question of manufactures, and especially manufactures by machinery. Professionally, of course, manufacture in which art is employed has engaged my chief attention; but still I have a general knowledge of manufactures from continual observation over a series of years.

1722. Have you paid special attention to musket making?—Not at all; I do not profess to give a professional opinion upon musket making.

1723. It is only the result of the tour that you made in America to amuse yourself?—Not so. I went out on a public duty; but though arms did not come within the objects on which I had to report, because scientifically they are classed as engines of war, and, therefore, they did not come within my department to report upon them; yet, as I resided at Birmingham, and had heard much said about Springfield, I visited it, because I had to visit the same neighbourhood to inspect other manufactories of a different character.

1724. You did not report upon Springfield?—No; it was not my duty to report on fire arms.

1725. When you went to America, did you ascertain the price of a musket?—I have an impression that they stated that it cost 37*s.* or 38*s.* English; but Mr. Whitworth, whose business it was to examine the machinery, would probably be able to speak more positively upon those technical points.

1726. Was the musket made at Springfield a rifle?—It was not; that is, the arm made at the State Armoury was not a rifle.

1727. Mr. *Newdegate.*] You stated that you saw the stocks finished by machinery, do you mean that there was no manual labour at all used in completing them?—If the Committee will allow me, I will endeavour to describe the operation (*the witness took up a Minié rifle*). A stock was taken in the roughly sawn state, and it was placed in a machine, in which it revolved, and those portions in which the banding is placed were cut out by means of a tool acting in that machine; the stock was then taken to another machine, and placed in this manner (*describing the same*); the whole of the groove of the barrel was then taken out by a revolving drill, down to the breech, and at the breech a wheel or cutter revolved until it cut out the breech at a right angle. It was then taken from that machine, andit was placed in another; and as the musket stock revolved, the whole of this portion under the barrel and along the hold (*pointing to the same*) was evenly turned, if I recollect rightly, so far (*pointing to the same*), by means of a very fine gouge or tool. It was then placed in another machine, and the whole of the portion in which the lock was fitted was carefully and smoothly drilled out; it was then placed in another, or in the same machine, I forget which, but this portion (*pointing to the trigger guard plate*), was also taken out. The butt furniture, which was different from this, and this (*pointing to the same*) was also cut out by machinery; or rather the grooves in which the furniture fitted having been drilled, or worked out, in a similar manner, the stock was so far finished that it simply required a slight filing or rasping, and then it was completed. That rasping and finishing was done, of course, by manual labour; that was the only amount of manual labour that I saw exercised upon the stock. I may say that the fit of the parts was so perfect, that when a lock was taken from a heap it fitted exactly into the part on the instant; the workman having previously tried it by a standard that he had by his side, and the same with the barrel, and every part of it in fact. I saw the lock, the barrel, and the furniture put into a gun, each part being taken indiscriminately from a heap, and I saw no choice made in the portion to be fitted.

1728. Were you informed what was supposed to be the cost of finishing the stock by that process?—I was not.

1729. Do you know whether the locks, which you saw taken from a heap and fitted to the stock, had been previously fitted to that same stock, or to one analogous to it?—It certainly could not have been fitted to that same stock, because

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because I saw the stock, as cut from the rough material, pass the machines until finished.

1730. And the lock had been previously finished?—Yes.

1731. Was the process that you saw at Springfield the same process that you saw at the Massachusetts factory?—I did not see the process of stocking in the Massachusetts arms manufactory.

1732. Do you know whether there is any such process adopted there?—I am not aware that there is.

1733. Mr. *Muntz.*] Can you state whether there was any difference between the outside of the gun, which is lying before you, and the American gun?—The Birmingham gun is certainly a superior looking article.

1734. I am speaking as to the difference of shape between the two guns?—I am not able to speak to any difference; I speak unprofessionally.

1735. You did not observe any difference in the heel-plate of the gun or the part at the shoulder?—None that I could detect; I see no reason why any ordinary form of stock should not be made by the same machinery that I saw employed at Springfield.

1736. You are at the School of Design, at Birmingham, are you not?—Yes.

1737. What do you do there?—I am the head master of the School of Art.

1738. Have you ever designed guns?—No.

1739. Have you not studied guns?—No.

1740. You stated, did you not, that the barrels were made at Hartford, in America?—No; I said that the barrels used at Springfield armoury were made at a mill, two miles from the Springfield factory itself.

1741. Did you see them made?—I did not.

1742. You are not competent to judge how far the machinery for barrel making used in this country, and that in America, are similar?—No.

1743. Did you see the locks made?—Yes.

1744. Are they stamped?—Portions of them are stamped, and then milled, as far as possible, and afterwards finished with a file.

1745. What part is finished with a file?—I will endeavour to describe. I will assume that the fitting portions were cut by machinery; I saw a mill at work, working out a hollow here (*pointing to a striker*), and it appeared that there were certain portions of the striker that were filed after it left this machine, in which a certain portion of the labour was done.

1746. Did you see them make bayonets there?—No.

1747. They do make bayonets there, do they not?—I understood so.

1748. The price of a gun you stated was 38*s.*, did you not?—If I recollect rightly.

1749. That was an American musket?—Yes.

1750. Not a rifle?—No.

1751. Did you hear what the price of a rifle was?—No.

1752. Did you examine any of the parts of the American musket?—I did, casually.

1753. Did you look at the barrel?—No.

1754. You are not sufficiently conversant, are you, to know whether it was a good one or a bad one, as to the inside or the outside?—No.

1755. But you believe that the guns made in this country for the Government are a more highly finished article than those made by that species of manufacture?—I have no doubt of it.

1756. You stated just now, that if we used the same kind of machinery, and the same intelligence, we might produce an equally good result as the Americans; what do you mean by the same intelligence?—I mean that the workmen engaged in superintending those machines were a very superior class of workmen to those that are usually employed in hand operations in this country.

1757. Do you think that the workmen used to attend those machines for making guns, in the United States, were of a high class?—They were a tolerably high class; an intelligent class of men.

1758. Did you learn what their wages were?—No.

1759. Did you find, in consequence of using those machines, a great reduction in the value and the nature of the labour employed?—Of course there were fewer men employed.

1760. What

1760. What else was required but men?—There was a certain amount of filing; a certain amount of finish to the stock; the stock is not turned out of the machine quite finished, but so nearly finished that a very small amount of labour is required to finish it; in fact, it simply requires smoothing to take the tool marks off the surface. The fitting parts are completed in the machines.

1761. Did you ascertain what portion of manual labour is really used upon a musket?—No. I wish again to repeat, that fire-arms were not in my special department as a commissioner to report upon; and such not being the case, I visited the manufactory more as a casual visitor, and as one interested in the manufacturing question, to see how far machinery had been employed in manufacturing a musket.

1762. What number of boys were employed in this manufactory?—Very few.

1763. Did you hear what the boys earned?—No.

1764. According to your report, the style of men employed as to intelligence is a superior class altogether?—Yes. I wish the Committee to understand, that the great majority of the working classes of the United States are a superior class to what they are in this country, I am sorry to say.

1765. Are they better educated?—Yes.

1766. Have you gone through the premises of manufacturers in Birmingham for manufacturing guns?—I went through several factories a short time ago, in order to compare the state of the Birmingham trade with what I had seen in America. First I went to the Tower, as it is called; then I went to Mr. Westley Richards, then to Hollis and Sheath's, and to Aston's, where I saw the process of lock-making; and then to Millward's, but I understand there are two Millwards; I do not know the christian name of the gentleman whom I visited.

1767. What did you see at Mr. Millward's?—The barrel rolling.

1768. Did you see any objection to the machinery employed for that purpose?—No.

1769. You did not see the barrel rolling in America, did you?—No.

1770. Then you cannot make a comparison between the two?—No; I beg again to state, that I was informed at Springfield that there was no material difference between the methods pursued at the rolling mill there and at Birmingham.

1771. Did you see the locks made?—Yes.

1772. How were they made?—In a somewhat similar manner to that in which ordinary door-locks are made, by filing; occasionally machinery was used. There seemed to be considerable uncertainty in the manner in which the parts of the locks turned out; taking a standard gauge, I could not suppose that a lock made at Birmingham, in the manner in which they do make them, would fit so readily into the stock as they did in Springfield; there would not be that accuracy of register.

1773. Did you see any of them fitted in?—Yes.

1774. They did fit, did they not?—Yes, after the fitter had worked at the stock for some time to make them do so.

1775. Were not the lock plates stamped?—I did not see any.

1776. Did you see any bayonets made?—I saw a few forging and a few grinding, but they were not finished.

1777. Did you see any ramrods made?—Yes; but I did not see the process in America.

1778. You really cannot make a fair comparison between the American gun and ours, as you have only seen parts made in each case?—No; but the great point that strikes me is, the admirable manner in which a gun is stocked in the United States, and the accuracy with which each part fitted into its proper place without trouble; barrel, lock, and furniture, such as guards and heel plate.

1779. You could not ascertain the exact cost of doing each part in the United States?—Not without writing.

1780. Do you know the number that they make per annum at the manufactory at Springfield?—No.

1781. Are they all one class of manufacture?—Yes, at Springfield.

1782. Are they muskets?—Yes.

1783. Are they all of the same form?—Yes.

1784. They are the same size, are they?—Yes.

1785. There are no rifles made there at all, are there?—No.

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1786. Colonel *Lindsay.*] You stated that there were no rifles made at Springfield?—Yes.

1787. Are you aware that, in the United States, rifles are made by machinery?—I saw them making rifles by machinery at the Massachusetts Arms Company, at Chicopee.

1788. Did any other gentleman who went out to report upon the New York Exhibition, report upon the Springfield or Massachusetts Arms Company?—Mr. Whitworth has reported upon them.

1789. Lord *Seymour.*] Were those rifles that you saw making at Chicopee for the government, or merely for sale?—For private use. The Arms Company at Chicopee manufactures birding guns and rifles for sportsmen; it is in fact a private establishment for the supply of gentlemen with arms.

1790. Colonel *Lindsay.*] Do they not also make arms for the Massachusetts militia?—I am not aware of that.

Colonel *James Archibald Chalmer*, R.A., called in; and Examined.

Col. *J. A. Chalmer*, R. A.

1791. *Chairman.*] WHAT office do you hold?—That of Inspector of Artillery and the Brass-foundry.

1792. How long have you held that office?—Eighteen months.

1793. What office did you hold before?—I was Assistant Director-general of the Artillery, and Secretary to the Select Committee; the offices are joined together; I had been also Assistant Inspector of Artillery for some time.

1794. Are you well acquainted with the construction of guns?—With great guns, with cannon; but with the making of muskets I am not so well acquainted.

1795. Are you the chairman of the committee of small arms?—I am a member of that committee, and I am acting as secretary; I am president of the sub-committee, to whom all matters are first referred.

1796. Are you acquainted with the alterations which Mr. Anderson proposes to make in the form of the lock and other parts of the musket, to facilitate the manufacture of it by machinery?—Yes; I have to-day seen the parts that he proposes to alter very slightly.

1797. Would that impair, in your opinion, the efficacy of the musket?—I do not think it would; but I should like to mention that even the smallest alteration made either in the musket, or in any part of our service, is always first submitted to the committee, and that committee report if it is the slightest alteration. No person can make the least alteration in any part of the *materiel* without that, and we give our opinion to the Master-General and the Board, and it is approved or disapproved by them.

1798. Lord *Seymour.*] You are one of the committee to whom the question of any alteration would be submitted?—Yes.

1799. Do you in your own individual opinion think that the alterations proposed would not be objectionable?—The alterations that I have seen to-day are really so slight that they would not alter the efficiency in any way of the musket; whether the cock is flat or round, it gives the same blow, and in the same position.

1800. Mr. *Newdegate.*] A report has been submitted to this Committee which was signed by yourself and Colonel Tulloh; and there is a paragraph in that report to which I would call your attention. It is speaking of the manufacture as at present conducted for the Government in Birmingham; and it says, "The several parts of the arms are made by different contracting parties, and therefore difficulties arise in obtaining that identity which ought to exist, either as to the quality of material or workmanship; and in cases of sudden emergency, it is not only difficult to procure the articles in sufficient quantity, but this system is the more prejudicial to the service, from the absolute necessity which might exist of being obliged to take an indifferent article at high price." Is that your opinion?—Yes, it is generally my opinion.

1801. Then you disapprove of the present system of issuing contracts to different contracting parties for the different parts of the musket?—I do, so far as I am a judge; I am no very great judge; my business has been in judging of the effect, and reporting the effect, more than actually looking at the machinery; I have heard so many objections to that course.

1802. You would willingly see the system of the contracts sent down to Birmingham

Birmingham altered and simplified, so as to entail the responsibility upon one party, or upon one or two?—Certainly; my reasons for thinking that, in regard to the musket, is the manner in which we make contracts for other parts of the service. In the artillery service I sould be very sorry to contract with one man for the block that makes the gun, and another for boring it. We make the contractor send the article in; we then try, and prove it, and it passes into the Government's hands.

1803. Yon have been connected, have you not, with the board for the superintendence of small arms, and with the general service of the Ordnance, perhaps longer than any member of it at present in the service?—I have been continuously employed in the business of small arms since the first beginning of the change from flint and steel to percussion, but that has been an extra duty as it were; I never held any office belonging to the small arms; I was a member of the first committee, and I am a member of the present committee, and I have acted by the request of the other members as secretary. It was necessary to have a sub-committee, because we could not get all the members from a distance. I am the senior officer at present on that committee.

1804. You are now actively employed, are you not, in duties connected with the small arms?—Yes, daily.

1805. You stated, did you not, that you are not much acquainted with the actual process of the manufacture of muskets?—No; I have had correspondence and acquaintance with many people that are so, and I have obtained perhaps a litile knowledge from that, but it was not my duty exactly.

1806. Is there any member of this small arms committee who has had any previous engineering or manufacturing knowledge of the actual process of the construction of arms?—Yes, we have Mr. James Gunner, who was brought up in that trade, and we had him on purpose to get information on those points.

1807. He has been very recently appointed inspector of small arms?—Mr. James Gunner is *superintendent* of small arms; his father is *inspector* of small arms. It is to Mr. *James* Gunner that I allude, who is a member of the sub-committee on small arms.

1808. The date of his appointment is very recent, is it not?—Very recent as superintendent.

1809. Do you recollect when it was made?—I do not remember exactly.

1810. Colonel *Dunne*.] Did you ever hear any objection on the part of the board for inspecting small arms to any of the pieces composing a musket, because they happened to be made by machinery?—No.

1811. Lord *Seymour*.] When small arms are rejected, are they rejected by the committee of which you are the president, or by the inspector?—Not the small arms themselves, but the pattern of every part would have to be recommended by the committee, and adopted by the Master-general and the Board; but those that would be received into the service would be viewed and inspected by far different people. We have nothing to do with that.

1812. Therefore a musket may have been refused and rejected without your knowing anything about it?—Certainly.; I know nothing about it.

1813. How many years have you been connected with the committee of small arms?—When the first change took place from flint and steel to percussion, long before 1842. The report of the committee that established that change was in 1839. I think we began it in 1836, and at that time I was appointed.

1814. Having been so long acquainted with the manufacture of muskets in this country, was it not until this year that you considered it necessary to overthrow the whole system?—I never gave any opinion about the system until I was asked for that report; it did not come to my knowledge. If the muskets that were produced to me had been bad, I should have thought it my duty to have mentioned it; but the muskets that were produced to me for trial being good, that was all that was required of me.

1815. You reported in January last, did you not?—I think so.

1816. Long as you had been in the standing committee on small arms, you had never before been asked to give your opinion on the subject?—Not my opinion as to the desirableness of having the musket made by machinery or otherwise.

1817. Nor as to the desirableness of having a Government manufactory, or

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of having it done by the trade?—No, that question has never been put to me; it has never been mooted before.

1818. I observe in your report that you speak upon the inadequacy of the establishment at Enfield?—Yes.

1819. Were you never asked before to report upon the establishment at Enfield?—No; I mean the inadequacy to produce that number of guns.

1820. Also you found fault with the establishment at Enfield as being a part of a very heterogeneous system?—Yes.

1821. You never before were called upon to give any opinion upon that?—Never.

1822. Two questions arise out of your report; one is, that machinery would be most advantageous in making muskets?—I think so.

1823. The other is, that it would be most desirable that the Government should make the muskets instead of the trade?—Yes.

1824. Why is it desirable that the Government should make them instead of private contractors?—That the Government should always have it in their power to produce muskets in a large quantity in any particular emergency; for instance, at the present time, which is a time different from common; we are now in a state of transition from the plain bore to the Minié rifle, and I believe the stores on that account are low, and I think that it is very desirable that the Government should have such an establishment just as we are wanting an immense number of muskets, so that they could produce them in future without the chance of any control or stop.

1825. Have you ever seen an American musket?—No, I have never seen an American musket. I have in my possession under trial, rifles and pistols, but I do not think I have ever had an American musket.

1826. You have recommended, have you not, that we should copy the plan adopted in America, of having a Government establishment for the manufacture of guns?—I did that upon inspecting Colonel Colt's factory; I saw, I thought, so much order, the thing progressing and going on from step to step, and at last arriving at tolerable perfection, that I think it a very good plan to imitate.

1827. Do you see any objection to employing Colonel Colt, who seems to have brought this notion into the country, and to have been a great originator in America of improvements in making muskets?—I see no objection to employing anybody that will produce a good musket.

1828. All that you want is to have a good musket?—All that I have been required to see, is that the muskets are good.

1829. As long as you can get a good musket, whether made by Colonel Colt or made in the Ordnance establishment, is a matter of secondary importance?—So far as the musket is concerned.

1830. Colonel *Lindsay*.] Would it not be a desirable thing that the Government should have it in its power to be independent, to a certain extent, of either Colonel Colt or any other man?—Certainly.

1831. In order that in a case of this kind, when large quantities of arms are required for the service of the country, and contractors might not be able to supply them in consequence of strikes among the workmen, or other difficulties to which the trade is sometimes exposed, they might furnish the arms themselves?—Yes; that is my decided opinion. Referring to that report of mine, I wish to state that my principal reason for recommending it was, that when first I began entering into this question, we had a store of 700,000 muskets of different sorts; now reckoning the number of muskets that would be required to keep that up, I mentioned that I was sure that 300,000 would be the extreme that we should want, but that was supposing if the Government had a manufactory it could, in times like the present, make them in greater numbers, otherwise we should want a larger store in hand. If the Government could not, under particular circumstances, makes a great number of muskets quickly, we should require to have a much larger store, and that involves, of course, considerable expense, not only in the original cost, but in people to look after them; it was upon that that my opinion was mainly asked.

1832. The view that you take of it is that the Government should be in all cases independent of private makers?—If private makers make them as well, I do not say so, because in my own department now we employ contractors.

1833. With

1833. With regard to iron ordnance, how do you procure that?—By contract.

1834. Then in that case the Government is not entirely independent of private contractors?—Not in that particular case.

1835. Are there not many other cases in which the Government is dependent upon private contractors for its military supplies?—Yes, for shot and shells, and so on; the contracts, I think, are so well managed now that we never fail; for instance, as to the iron ordnance that are contracted for by Government to be furnished at the end of the financial year, I have already received every gun, and proved every gun, and they are very numerous.

1836. You have no fear that the country would be left without the means of defence, because there is a contract for iron ordnance instead of its being made in the factory at Woolwich?—That would depend a great deal upon circumstances; they would ask higher prices of course in an emergency, and it would depend a great deal upon the temper; but I should not fear getting any number.

1837. You have not recommended the manufacture of iron ordnance to be independent in that respect also?—I should say not; we have done so well by contract and with the rules that the Ordnance have put to those contracts. It is not a general contract; it is managed under particular rules; and then the boring and the passing of a cannon is so different from that of a musket that the dimensions are more easily ascertained, and then the heavy proof that they put them to at once secures their safety and their stability. You cannot do that so well with a musket.

1838. Colonel *Lindsay*.] There is not that constant alteration in shot and shell that there is in the manufacture of a musket?—No.

1839. Colonel *Boldero*.] Mr. Anderson informed the Committee that with all his ingenuity he could not undertake to make the whole of the component parts of a musket by machinery, unless several alterations were made in the form and shape of the musket; how long would it take to set a musket up upon the plan and principle proposed by Mr. Anderson?—I should like before I answered that question to understand exactly what those alterations were that Mr. Anderson proposed, because, if I understand all the three very trifling things that Mr. Anderson showed me; one was in the shape of the hammer, whether it should be round or flat, like most of the sporting guns are; another was the alteration of the shape of the guard, whether it should have a different curve, and another was the curve of the brass plate of the stock, the heel plate; those are the only three things that I understood Mr. Anderson to suggest; he did not touch upon the bayonet with me.

1840. The bayonet was to be straight, and to be made of one piece instead of two; how long would it take to get a musket up; would it take a week?—No, I should think not; I would get one done at Enfield with those different things that Mr. Anderson wishes.

1841. *Colonel Dunne*.] After hearing Mr. Anderson's propositions, are you of opinion that the change which he proposes would make the slightest difference in the efficiency of the musket?—I do not think it could make any difference whether this be flat or round. The use of this (*pointing to the hammer*) is the blow that it gives, if it gives an 18lb. or 20lb. blow, whether it is flat or round; it does not signify as to the guard whether it is flat or round; it may be a question for the eye whether it is so strong.

1842. In your opinion the proposed changes would not alter the efficiency of the gun?—No, I do not think they would.

1843. Mr. *Newdegate*.] Supposing some alterations of this kind had been suggested by the trade of Birmingham, for the sake of enabling them to manufacture the gun cheaper, would they have been admitted by the Ordnance?—That I cannot answer; that does not come within my province.

1844. Mr. *Muntz*.] You cast your brass guns, do you not?—Yes.

1845. You do not cast the iron ones?—No.

1846. Why not?—I cannot give any other reason than that we have not got the foundry necessary for them.

1847. You never have cast them?—No.

Lunæ, 20° *die Martii*, 1854.

MEMBERS PRESENT.

Sir William Molesworth.	Lord Seymour.
Mr. George Dundas.	Colonel Lindsay.
Mr. Monsell.	Colonel Boldero.
Lord Paget.	Mr. Muntz.
Mr. Newdegate.	Mr. Walpole.
Colonel Dunne.	Mr. Geach.

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

The Right Hon. General Lord *Raglan*, G.C.B., Examined.

Right Hon. Gen. Lord *Raglan*, G.C.B.

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1848. *Chairman.*] HOW long was your Lordship at the Horse Guards?—I believe nearly 25 years.

1849. How long have you been Master-general of the Ordnance?—About 18 months.

1850. As Master-general of the Ordnance, are you charged with the responsibility of providing a sufficient supply of small arms for the defence of the country?—I am.

1851. Are you satisfied with the present mode in which that supply of small arms is obtained?—I confess that I am not.

1852. Will you state for what reason?—Because I cannot be sure of obtaining a sufficient supply at any moment.

1853. Does your objection apply to the details of the system only, or does it apply to the system generally?—It applies to both; I think that the system, as at present established, is very deficient; besides that, I think that for the defence of the country the Ordnance should have at command the means of supplying Government at any moment with a sufficient quantity of arms; we may at any time be called upon for a very large quantity. In 1814 we had nearly 800,000 men under arms, and not many months ago we had the apprehension of war near home, and if it had taken place every species of volunteer corps would have been called out, and they would all have required arms.

1854. Cannot you obtain that supply by contracts with the gun trade?—So far as I have been able to see, we cannot; in the month of June 1851, we contracted for 28,000 Minié rifles, and they were to have been supplied in March 1853, but they were not supplied till November 1853.

1855. Are the Committee to understand you to say that you do not consider it safe to depend upon a supply of small arms to be provided by contract?—Certainly.

1856. What system would you substitute?—I would establish a small arms manufactory; that would not only make us independent of the contractors, but would also insure a supply at any given time, and within a reasonable time.

1857. Do you state, upon your responsibility as Master-general of the Ordnance, that you consider it unsafe for the country to go on without a Government manufactory?—Most certainly.

1858. Do you consider it important to have a manufactory, and to commence as soon as possible?—Yes. If this Committee had not been assembled, Mr. Anderson probably would by this time have been well on his way to America to inspect the establishments in that country.

1859. Lord *Seymour.*] In the long period during which you were at the Horse Guards, was the defect brought under your notice with regard to the system of supplying arms?—No, it was a time of peace throughout, and the augmentations of the army were very trifling. At one moment the army was reduced, and

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and at another time increased, but not to an extent to make the thing felt. The fire at the Tower took place whilst I was at the Horse Guards, and it occasioned the destruction of all the arms in store there; I cannot exactly say to what extent, but I know when I first came to the Ordnance there were 900,000 stand in store, and the loss by that accident was very great.

1860. A very large number of arms, several hundred thousand, having been destroyed at the Tower by the fire, and the store having thereby been diminished, did the authorities at the Horse Guards not at that time consider the mode of replenishing the supply?—No, the Horse Guards did not; they had a good deal of communication with the Ordnance as to the introduction of percussion muskets, but that was independent of the general supply; and what steps the Ordnance took upon that point I do not know.

1861. Do the Ordnance supply the militia as well as the army?—Yes.

1862. Do they supply them with the same pattern?—They would if they had them, certainly. There is this to be said, that if you gave a good arm to one branch of the service, the others would think themselves very ill-used if they had it not also. They would think that they had not the same means of protecting themselves, and repulsing the enemy; therefore I should say, that if you had an excellent arm for the line, the militia and even the volunteers would expect the same.

1863. The arm used for the line would be the arm for the militia?—Yes.

1864. There are, as it seems now, three or four different kinds of arms supplied; do you mean to bring them all into one system, and to one pattern?—We hope to introduce the pattern of 1853, which is a rifle arm; we have now a contract for 20,000 of these.

1865. Then that would supersede every other kind of arm, both of the navy and the army?—It is not of such importance for the navy; they do not mind whether the arm is a little lighter or heavier; they have not to carry it; but it woould do so in course of time.

1866. If you had one set of machinery making arms upon one pattern, it would then be possible, if desirable, to supply all the services with the same weapon, would it not?—Certainly.

1867. Is that your intention?—Certainly, that is my view.

1868. With respect to the carbine; the carbine must be of a different pattern, must it not?—Yes; then we should have the same ammunition, and it would be the same bore; the great inconvenience of our service is having more than one bore. That we shall feel now.

1869. Because they have that arm of 1851, and the arm of 1853?—No, we have not got the last yet; we have the arm of 1851, and the old percussion musket.

1870. As soon as you introduce the arm of 1853, you will have three different bores?—Then we shall withdraw the Minié of 1851, and the plain bore muskets.

1871. That withdrawal will be attended with considerable expense, will it not?—Yes, these improvements in the arms cannot be effected without expense.

1872. Do you contemplate also providing the carbines in the manufactory that you would establish?—I hope that we shall be able to do so.

1873. If they are not made on the same pattern as the musket, they will require other machinery, will they not?—Yes; I think there will be no great difficulty in introducing it; it will grow out of the establishment. The important arm is the infantry arm.

1874. Do you think it desirable in this country to keep up or to encourage the manufacture of arms commercially among the people?—Of course, as a matter of trade; I think that every establishment will be improved by our having one of our own.

1875. Do you contemplate in an establishment of your own making all the arms, or do you contemplate making only a certain portion of them?—I look to making the whole, but then they can copy us for general sale.

1876. The Committee has been informed, that in America it is considered a matter of policy to encourage private manufacturers, and though the Government have the power of making, they really do not employ that power, but they make a certain portion, and obtain the rest by purchase?—They have two large manufactories of their own, and they have Colonel Colt's establishment besides. I believe

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I believe they buy of him; but in America every man is armed, so that the supply is endless almost.

1877. Even with that large supply, it seems that the Government consider it desirable even for Government purposes to purchase rather than to make the whole?—Yes, they do it to encourage the trade, which is new there, comparatively with us.

1878. The Committee that sat in 1849 were told by Mr. Lovell that it was considered very desirable to keep up the manufactory in London, as well as the manufactory in Birmingham?—I hope that we shall be able to get rid of the outlying establishments.

1879. You contemplate getting rid of the Enfield establishment altogether, do you not?—Yes.

1880. Do you contemplate selling that property?—That question has not been mooted yet; I should think that that would probably be the result.

1881. And that the Birmingham establishment would be parted with?—Yes.

1882. Mr. *Muntz.*] Your Lordship stated just now that you thought there was no safety in obtaining arms by contract, and that you could not depend upon the supply; you are aware, are you not, that the supply up to 1815 was obtained almost entirely by contract?—Not entirely; for there was a Government establishment which, in the years 1812, 1813, and 1814, manufactured 126,000.

1883. Are you aware what the manufacturers did in the meantime by contract?—I do not know; I found lately a paper from a connexion of mine, who was a clerk in the Ordnance, in which, in consequence of having established the Ordnance manufactory, his expression is, that we had been able to supply Europe with arms, and to control the contractors as to price.

1884. Was not a large quantity made by the contractors, and many times the quantity you have mentioned, during that time?—Very likely.

1885. Was not the establishment of the Government manufactory a sort of check upon the contractors?—That was one of the objects of it.

1886. You were aware that there was formerly an establishment at Lewisham?—Yes, and in the Tower also.

1887. Are you aware that the first grant asked for Lewisham was 16,000*l.*?—No, I do not know that; I know that 96,000 barrels, and 84,000 locks, were obtained at an expense of 13,000*l.* less than they would have been by contract.

1888. Perhaps you are not aware that the expenditure at Lewisham, which was intended to be 16,000*l.*, eventually came up to 66,000*l.*?—No, I do not know that.

1889. And that it was afterwards abandoned, in consequence of being found to be exceedingly unprofitable?—It had the effect during the war of enabling us to provide a sufficient number of arms, either by contract or the Government establishment, without having recourse to foreign assistance.

1890. Still it was not the principal manufactory?—No.

1891. You expect to supply arms by machinery entirely from the Government manufactory in future?—Yes, I hope so; but in the last war machinery was not introduced.

1892. With regard to machinery; you have not seen the working of that machinery, have you?—Only at Colonel Colt's establishment.

1893. You have not seen it in operation making muskets?—No.

1894. Of course you do not form your opinion from your own observation; you must depend upon some one for information as to the capability of this machinery?—Yes.

1895. Upon whose information do you found your opinion?—Chiefly upon Mr. Anderson's report. I have implicit confidence in him.

1896. He never having seen the machinery himself?—He has made a very great deal of machinery.

1897. Does your Lordship depend entirely upon Mr. Anderson for your opinion?—I depend entirely upon Mr. Anderson, and the Report of the Committee of Officers, who were assembled by my orders to consider the matter.

1898. But the committee had not seen the American work?—No.

1899. How did they form their opinion that the American work is equal to the work that is required here by the Ordnance?—We shall see that when the work is produced.

1900. Your

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1900. Your Lordship, I suppose, found no difficulty in obtaining a supply of muskets from the contractors between the time of the peace and the introduction of the Minié rifle, did you?—There was a great quantity of arms in store till the fire in the Tower.

1901. But since that, on the percussion principle being adopted?—I never found any difficulty till I came into the Ordnance myself; and then I saw the difficulty from the very commencement, and it has occasioned me more anxiety than anything else since I have been there.

1902. The arms were supplied by contract, or almost entirely so, between the peace and the introduction of the Minié rifle, were they not?—I suppose that no great quantity was supplied between 1815 and 1841.

1903. But between 1841 and 1851 a good many were supplied?—Yes.

1904. You are aware that the Minié rifle is a superior article to any guns formerly made, and involves a different course of manufacture?—Yes.

1905. Your Lordship will probably allow that the introduction of a new material which the men have not been accustomed to, must entail upon all trades delay in the first instance?—I think that there were other causes for delay; there were some misunderstandings between the contractor and his workmen.

1906. I think from what your Lordship has stated, your principal ground of advocating the establishment of a Government manufactory is the impossibility of getting a supply without it?—And to insure a supply within a reasonable time, which I hope we shall do. It might happen, if we were obliged to go abroad for arms, to manufacturers near home, that they might be unable to supply at the rate required; or they might not be at liberty to supply, as they might be so situated, politically, that they could not undertake to do so.

1907. Does your Lordship calculate upon any great advantage or saving from the establishment of a Government manufactory?—Yes; we hope to effect a very large saving.

1908. Is that founded upon the representations of Mr. Anderson?—Yes.

1909. You rely entirely upon him?—Yes, implicitly.

1910. Supposing that you found that the work done by machinery was not of such a character as to realise your expectations, and that it did not turn out such work as you would receive, what would you do?—I should be very much disappointed; I am very confident that it will succeed.

1911. But the outlay will have been made then?—Yes, but I do not think it will be unsuccessful.

1912. You ought to be sure that the work will be such as you require to be made, ought you not?—I am as sure as I can be of a thing that has not been tried.

1913. Have you ever seen any man that has seen this gun made by machinery in America?—There are some gentlemen here, I believe.

1914. Are they judges of a musket?—That I do not know.

1915. Has any one told your Lordship yet, that the guns that are made in America are of a similar quality to those that you require at the Board of Ordnance?—No, I cannot say that, because I have not seen anybody that has seen them, except Colonel Colt.

1916. He admitted that the work was not so good, and that the only advantage that the Americans had was the uniformity?—If they can be made at all, I should apprehend they can be made well.

1917. Colonel *Boldero.*] Your Lordship was asked a question with regard to the expense that would be entailed upon the country by withdrawing the musket of 1842, and substituting that of 1853; do not you think that the expense can in some degree be counterbalanced by rifling those muskets, and re-issuing them again for the naval service, the weight not being an impediment, nor yet the difference of bore, so that there would be only one description of ammunition?—That might be done; I believe the navy are very well satisfied with the rifle musket, but then we should replace them as they should wear out.

1918. You have no objection to find with your establishment at Enfield, except that it is too small?—I wished it to be there; but there was not room, and it was considered that there would be a difficulty in getting labourers.

Mr. *Joseph Whitworth*, called in; and Examined.

Mr. *J. Whitworth.*

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1919. *Chairman.*] ARE you an engineer?—Yes, I am.

1920. Are you a manufacturer of machinery?—Yes.

1921. What description of machinery do you generally make?—Lathes, planing and other machines, generally called manufacturing machines.

1922. Is the class of work that your machines produce required to be accurate?—Yes, great accuracy is required.

1923. Do you make what are termed self-acting machines?—Yes.

1924. Is there much advantage in having machines self-acting?—Very great.

1925. Is the work performed by them likely to be as accurate as it would be if the agency of an attendant were constantly employed?—Yes.

1926. Is a self-acting machine likely to perform as much work as a similar machine not self-acting?—Yes, generally more.

1927. Will you explain for what reason?—Not requiring the attendance of a man, the work is often of a superior quality and more regular than it would be if moved by hand.

1928. Do you consider the employment of self-acting machines as a general principle to be economical?—Undoubtedly.

1929. Have you examined the several parts of a military musket?—Not particularly.

1930. Have you examined them sufficiently to know whether all or most of those parts may be produced by special machinery?—Yes, I may say that I consider that the manufacture of a musket would divide itself into three departments. In the first, the employment of self-acting machinery, where the machine when once started goes on of itself; in the second department, where machinery and hand labour work in conjunction together; and the third department, is that of hand labour only, where simple tools are employed generally, by hand, such as the file; these are the three departments into which I think it naturally divides itself.

1931. Have you, as an engineer, been much engaged in devising and introducing into the engineer trade of this country more accurate systems of performing work?—I have.

1932. Can you give the Committee any examples?—What applies most to the present case, I think, is the making of flat surfaces, or a perfectly straight line, and the power of measuring with very great accuracy.

1933. You have introduced a system of uniformity in screws, have you not?—That I introduced some years ago; the Admiralty adopted the system, I think, about the year 1840; in fact, they are in general use all over the country; I may say that in the fleet that has just gone out, all the parts of the different marine engines have all their screws uniform in pitch for a given diameter. I have here some specimens (*pointing out the same*). This is a sample of a gauge of half an inch diameter; they are made for the Admiralty up to six inches, so that every pin of half an inch diameter is made to fit this half-inch gauge, and so on for other sizes (*pointing out the same*).

1934. Did you introduce the system of uniform gauges?—Yes.

1935. Likewise the system of uniformity of screws?—Yes.

1936. Did you introduce likewise the system of scraping instead of grinding?—Yes; this is a specimen of the work as it leaves the machine (*exhibiting the same*), and this is a specimen of the work as it is got up by scraping (*exhibiting the same*). I may mention, also, that 130 years ago, when it had to be done by the file and chisel, the cost of doing it was 12*s.* per square foot with surfaces of great size, which were no better than that surface (*pointing out the same*). The same work can now be done, if there is a repetition on a large scale, at 1*d.* I do not know anything that shows better than that the progress which has been made in this important process.

1937. Lord *Seymour.*] Then it requires large quantities to be done, does it not, to do the work at that price?—Very frequently things of this nature now are made extensively on a large scale.

1938. *Chairman.*] Have you introduced the system of minute measuring?—I have.

1939. And the surface-plate?—That is what I am now explaining. This surface-plate, which is now finished by hand, now requires an expenditure of

4*s.* per

4 *s.* per foot to get it into this state (*pointing to a specimen*); whereas, in this state, (*pointing to another specimen as left by the planing machine*) it can be done for a penny.

1940. Are those improvements capable of being applied to the military musket?—Yes, they are.

1941. Would there be any positive advantage in applying them to the manufacture of muskets?—I consider there would; very great.

1942. Will you state what those advantages would be?—As I have just before said, in guns, what is wanted is a perfectly straight line, and an exact size; and here I give the Committee an example of it: you will perceive that these gauges are perfectly hard (*pointing to some specimens*), and nothing will cut them but a diamond. You can very well perceive any difference in the fitting of the two, and of course by making gauges upon this plan you would be able to ascertain exactly the size of the barrel, and its diameter in different parts of its length; whereas, at the present time, very little is known about it. There are no means of knowing when a barrel is exactly true except by the sighting, which does not give you the exact diameter.

1943. Would the application of these inventions render the several parts of a musket more nearly alike in diameter than at present they are?—Yes, it enables a person to make them of the exact size, whereas now he has no exact means of ascertaining whether they are so or not.

1944. Then is it your opinion that it is possible to produce the several parts of a military gun with sufficient accuracy by machinery, so that they shall fit together, and require comparatively little finishing by hand labour?—It is hardly possible to do that; they do require hand labour.

1945. What amount?—That would depend upon the care that was taken in attending to the machines, and on their quality.

1946. You think that it is not possible to make them with sufficient accuracy, but that some hand labour would be required?—Quite impossible.

1947. Are you acquainted with the extent to which machinery has been applied in this country to the several branches of the military gun trade?—I never had my attention called particularly to it till this time.

1948. Has your attention been called to it lately?—Just recently.

1949. What is the result, in your opinion, with regard to machinery?—I think it is capable of great improvement.

1950. In what way?—The barrel being the most important part of the rifle, I may just mention that the process of turning it may be much improved. At present the barrel is turned in a lathe in which one cutting tool only is employed, which is liable to strain the work. I have introduced, as you see by this diagram (*exhibiting the same*), another cutter, so that the work is operated upon on both sides, and a balance of forces is established which prevents undue strain. With regard to the rifling, I think that may also be very much improved; also in the mode of dealing with what is called the lump, the breech end of the barrel, which is now roughed out with circular cutters, and chipped and filed by hand labour. This (*pointing to the diagram*) will explain the sort of machinery that would be employed, which can be attended to by an intelligent labourer.

1951. Do you think that those results could be produced by machinery at less expense than they are now produced by hand labour?—Yes; they would be produced at a much less rate, and much better.

1952. Have you seen Colonel Colt's pistol manufactory in London?—I was through it some time ago.

1953. Would the machinery there employed be applicable to the different parts of a musket?—Some, no doubt, would.

1954. Have you been in any other pistol manufactory where machinery has been extensively applied?—I was last Saturday at Messrs. Adams & Deane's manufactory; that was for the manufacture of pistols more particularly; and I was very much pleased with some of the machines that I saw there, the mode of boring the pistol, and also of rifling.

1955. Could any of the machinery which you saw there be applied advantageously to the making of muskets, do you think?—With some modifications.

1956. Have you ever been to America?—I have.

1957. What was the object of your visit to the United States?—I went out as a member of the Commission that was sent by the Government last year.

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1958. Whilst there, did you visit any of the small arms manufactories of the country?—I visited Springfield.

1959. Did you visit any other?—I did not go through any other; one establishment I called at, but they were not at work, and I did not see it.

1960. Did you visit any of the private establishments?—Yes.

1961. Are you aware whether in America machinery has been more extensively employed in making muskets than in this country?—I have no doubt of it.

1962. Do they employ machinery in making the locks of muskets?—To some extent it is used.

1963. To what extent?—The parts are roughed out by the machines, and finished by hand.

1964. Could similar machinery be applied to making the locks of our muskets?—No doubt it could.

1965. If so employed, would the locks be as good and as serviceable as they are now?—Yes.

1966. Would they be cheaper, or more expensive?—Cheaper, no doubt.

1967. Would such locks require much hand labour in finishing the parts that are required to fit?—That would depend upon the care that had been taken in constructing and in attending to the machines.

1968. If sufficient care were given to the machines, would that result be produced?—Yes.

1969. When you were in America, did you see the machinery in actual operation making gun-stocks?—I did.

1970. Will you state to the Committee what length of time it required to produce a stock by machinery?—The man's time given to the whole operation was 22 minutes, $4\frac{1}{4}$ seconds; he took care of two of them together in some instances.

1971. With regard to the time, is the statement contained in your special report on the Springfield armoury?—Yes.

1972. What time would be required to bring a stock up to the same point by hand labour to which it is brought by machinery at Springfield?—I believe that the present cost of making a stock, and getting it into the same state as the machinery would do, is about 10*s.*; what it may be in time I am not aware; I am not aware of the number of hours that would be required, but the cost of doing it is 10*s.*, and the time would be ascertained from the amount paid to the men.

1973. Mr. *Newdegate.*] Do you mean 10*s.* in America, or here?—Here.

1974. *Chairman.*] How many machines were required to produce a single stock?—Sixteen.

1975. Were the gun-stocks produced accurately?—Very.

1976. Are the stocks produced by machinery liable to any objections which do not apply to stocks cut out by hand?—There cannot be any objection that I can see.

1977. Does a stock produced by machinery require much hand labour to complete it?—Comparatively none, it was sand-papered over and varnished; there is a little hand labour, as the Committee will see by the Report, included in those 22 minutes, $4\frac{1}{4}$ seconds; one operation being 1 minute, 42 seconds, and the other 35 seconds; that was the total of the hand operation without the machinery.

1978. Could machinery similar to that which you saw at Springfield be applied to the stocks of our military muskets?—Undoubtedly.

1979. Could you form an approximate estimate of the value of a single set of such machinery?—I scarcely could, but it would not be less than 5,000*l.*, I should say.

1980. For making stocks?—For making the machinery that made these stocks that I saw; it might be more; it is merely a rough guess.

1981. Were you the maker of Mr. Jordan's machinery, by which the carving for the Houses of Parliament was executed?—Yes.

1982. To what extent did that machinery cheapen the carving?—I am not aware, but I know that Mr. Jordan in some cases told me that the cost was not more than one-fourth; but what it was on the average I am not aware.

1983. Is such machinery applicable to the making of gun-stocks?—It would be applicable, no doubt, for some parts of a stock, but it is not so well adapted for a musket as the machinery which I saw in America.

1984. Have

1984. Have you ever examined a gun-barrel?—I have.

1985. Is a gun-barrel required to be very straight in the bore, and very exact as to dimensions?—It is.

1986. Have you ever been engaged upon anything that required to be equally accurate?—Much more so; these gauges (*pointing to the same*) are made generally for engineers, and we have no more difficulty in measuring the 20,000th part of an inch in the machine, than the 10th of an inch; so that we can make a great number exactly of the same size, and enable all engineers who adopt them to work to the same measure; but in some cases it is not convenient to have this form of gauge (*exhibiting the same*), and this form (*exhibiting the same*) is adopted. This is a square piece of steel, made true on its sides to enable us to make the ends at perfect right angles, and we are able to measure their length to the millionth of an inch, and make any number of them. This (*exhibiting the same*) represents the inch standard. Formerly if an engineer wanted to know what an inch was, he knew nothing; all that the Government did was merely to give a yard measure, represented by two lines, and every person got any other lengths in the best way he could; and the consequence was, that the sizes in the different workshops were various. My attention being turned to this many years ago, it has resulted in this, that we can now make those measures quite easily to the millionth of an inch. In fact, taking the measure of the standard yard of this size (*exhibiting the same*), when it is in the machine, variations in the measurement may be detected by the slightest touch of the finger. These surfaces we are able to make with very great exactness, and we have the power of making them as flat as we can desire.

1987. Are you acquainted with the manner in which barrels are made at Enfield and other places in this country?—Yes, I am.

1988. Does that system of making barrels agree with your ideas of producing accurate gun-barrels?—It is a very difficult matter to make a perfect barrel, because of the light material that you have to deal with; but by introducing these gauges (*exhibiting the same*) of a proper diameter, with a rod similar to a ramrod screwed on the end, you can put them down the barrel, and ascertain the exact diameter, and so enable a man to operate much better than he could otherwise do.

1989. Would you be able in that manner to produce a perfect barrel that would not require either straightening or setting with a hammer after it was bored?—I would not like to say without having experience.

1990. Have you ever seen a barrel bored out of a solid?—Not a gun-barrel.

1991. Could a gun-barrel be bored out of a solid, do you think?—No doubt it could, but whether it would be economical to do so, I am not able to say.

1992. Are you acquainted with the present system of detecting by the shade the straightness of the bore of a barrel?—I am.

1993. Is that a satisfactory system of testing the truth of a gun-barrel?—I think it is, in connexion with the method which I have just suggested, that of using gauges.

1994. Is it practicable to finish the outside of a military musket-barrel in the turning lathe, without having recourse to the grindstone?—Certainly.

1995. Is it possible to produce a barrel sufficiently correct on the outside that it would not require to be afterwards draw-filed?—Yes, the draw-filing cannot add to its correctness; it merely makes the lines in the direction of the length of the barrel instead of being round it.

1996. Have you ever seen any machinery for rifling gun or pistol barrels?—I have.

1997. Is it practicable, in your opinion, to make a self-acting machine that would rifle a number of gun-barrels at the same time?—I think it is.

1998. Could the rifling be performed by a self-acting machine with the same precision as it is now done by hand?—I think with much greater precision than at present.

1999. Would there be much saving in doing it by machinery?—No doubt there would. The present cost of rifling a barrel is not much; it would be more in quality, that it might be improved, than in the saving. There would be some saving, no doubt.

2000. Suppose all the parts of a musket to be produced by suitable machines, would they be likely, when put together, to form as perfect a structure as if made by

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by hand?—As I have said before, the manufacture of the rifle divides itself into the three departments which I have mentioned, and hand labour must be used.

2001. Mr. *G. Dundas.*] You were at Deane & Adams's manufactory, were you not?—Yes.

2002. Were there any other self-acting tools there for the manufacture of pistols except those commonly in use, such as lathes and planing machines?—Yes, there was a rifling machine, which was a very nice machine, and I was informed that a man rifled 50 barrels per day on that machine, and that before that was made, he made by the common method 10.

2003. Are you aware where that machine was made for rifling?—They made it themselves.

2004. Does there appear to you to be any mechanical difficulty in the way of substituting self-acting machinery for hand labour in the manufacture of gun barrels?—The present gun barrel is now done partly by self-acting machinery. The boring is what I consider the second department, where the man and the machine work in conjunction with each other. Then the outside of the barrel is done by a self-acting machine, a turning lathe.

2005. Lord *Seymour.*] You stated, did you not, that the mode of turning barrels might be very much improved?—Yes.

2006. Did you see the barrel making in America, at Springfield?—Unfortunately I did not; the barrel making is at some distance from Springfield, and I did not see it.

2007. You cannot give the Committee any opinion whether or not they have introduced in America an improved system?—I believe not; I did not see it.

2008. You contemplate a considerable improvement in the first operation, in the turning of the barrel?—Yes, in the method which I have shown in the diagram.

2009. Will that be attended with greater economy than by the present mode?—Yes, and much better quality; the advantages in the quality are more than in the economy; if you have two tools operating instead of one, you do double work, or very nearly.

2010. To what machinery is applied the system you wish to apply to the turning of a barrel; is it applied in any way?—The lathes in my own establishment are made on that principle.

2011. The same principle that you used there you would apply to gun barrels?—Yes, exactly.

2012. Do you know what the price paid for a musket in America is, when the Government purchase that musket?—I do not.

2013. You saw a musket made at Springfield complete, did you not?—No, I saw it put together complete.

2014. You saw it when it was complete?—Yes.

2015. Were you a sufficient judge of a musket to be able to form an opinion of the musket which you saw in America, as compared to the musket which is supplied to the Ordnance in this country?—I did not examine a musket in America minutely; but it is my opinion, that with regard to an American musket, taking a number of the different parts of it, there is greater identity than there is in the rifles manufactured in this country, because there is so much more attention paid to the machinery, and also to the persons attending that machinery; but I am of opinion that the parts of one individual musket are not so good in America as the rifle which I have seen here.

2016. You consider that the parts of an American musket are not so good as the rifle which you have seen here, taking a sample of one weapon of each kind?—Yes; but if you took 100 of each kind, you would find much greater identity amongst the parts of the American musket than you would in the English rifle.

2017. Do you know where they get the iron at Springfield for manufacturing the muskets?—I do not.

2018. Is not the quality of the iron of great importance in making gun barrels?—Of the first importance.

2019. And the price of iron varies very considerably for such purposes, does not it?—Yes, it does.

2020. Therefore, in estimating the cost of a good musket, one material question that enters into consideration is, the quality of the iron in the first place?—Yes, undoubtedly.

2021. With

2021. With regard to the forging of barrels, have you seen that done in this country?—I have

2022. That is all done at Birmingham or in the neighbourhood, is it not?—I believe so.

2023. Would that be a part of the manufacture which you would contemplate doing in the Government establishment?—Yes.

2024. Is there any peculiar advantage that Birmingham and the neighbourhood possess for forging barrels, over any other part of the country?—I am not aware of it, except that labour and fuel there would be cheaper than in London.

2025. Does the quality of the coal in the district make a difference in the manufacture of iron for those purposes?—Of course it does.

2026. Is not the coal there more free from sulphuret of iron, and considered a better coal?—I do not think it is.

2027. Do you consider that any coal would be equally good for the purpose?—No; I think that the coal used in London, which is procured from Newcastle, is quite equal to the Birmingham coal.

2028. Do you know at all the price per ton at present of the best iron for the purpose of manufacturing barrels?—I believe it is about 22 *l.* a ton, but I am not certain; it is thereabout, I believe.

2029. You have described very minutely the making of a gun stock at Springfield; you state that the stocks there are purchased in the rough state for 1 *s.* 2 *d.* each?—Yes.

2030. Do you know what the stocks are purchased in the rough state for by the Ordnance here?—I do not; Colonel Ripley informed me that that was the price that they paid for the rough stock in America, and I saw that the saving was so great in producing such a beautiful stock, that I was desirous of knowing about what the total cost was, and therefore I asked the price of the rough stock.

2031. You are not aware whether or not the Government here have paid as much as 3 *s.*?—I am not.

2032. You have stated that the gun stock required 16 machines to make it?—Yes.

2033. Would that machinery be equally applicable to the stock of a carbine?—Yes, it would.

2034. It would not require a special machine for every different cut?—No; whatever pattern you put into this machine it would produce a corresponding stock; all that you require is an iron pattern; it can be adapted to a different sort of stock; if you turn to my report on the last-making machine, which is there described exactly, it is a similar one; and of course, if it is used for all sizes and descriptions of lasts which shoemakers use, it would do any kind of stock.

2035. You have stated that if you compared one part of the musket made in America with one part made here, the part of the English musket would be considerably superior?—Yes.

2036. Does that apply to all the different parts indiscriminately, or to any particular part of the musket?—As the Honourable Member may be aware, the parts of the lock of a musket require to be hardened, and of course in hardening it gets out of truth, and it requires restoring; and I think that there are much greater pains taken here in restoring those parts, and in making the fittings good, than the Americans think it worth while to bestow.

2037. That can only be done, I suppose, by hand labour?—Only by hand labour.

2038. And the Americans do not think it worth while to bestow that hand labour upon it to perfect the weapon?—Not to the extent that it is done here.

2039. With regard to the American locks, did you examine their mode of making locks?—Not very particularly.

2040. With your knowledge of machinery, did it strike you that there was anything very novel in their mode of making locks, or that you had not seen applied to other machinery in this country?—No.

2041. There was nothing very novel in it?—No.

2042. The part that seemed to have struck you as most novel was their mode of working wood in stock making?—Yes, wood generally.

2043. Altogether in America, you were more struck with the mode of working the

Mr. *J. Whitworth.* the wood than their mode of working the iron?—Much more; they are not equal to us in the working of iron.

20 March 1854. 2044. In the working of wood you consider them superior?—Yes, also in stone; they are introducing machinery there with great success that we have not yet got in this country.

2045. For working the stone?—Yes.

2046. You have referred in your report to the more fortunate position in America of the workmen and their masters, and you state that the principles which regulate the relations between the employer and the employed are, you think, better understood and appreciated in the United States?—Yes.

2047. That, therefore, gives them a great advantage in their manufactures, does it not?—Of course it does.

2048. In your observations upon this important question, did anything suggest itself to you which you think might be adopted in this country, with a view to establish the same good understanding between the employer and the employed which exists in America?—I know of nothing except the more general education of the people; there is more intelligence there.

2049. Does it strike you that the people here who have been resisting the terms of their masters are generally an uneducated class?—Generally, compared with what they are in America.

2050. As you have been largely engaged in the manufacture of machinery in this country, has it ever happened to you to have your workmen strike?—No; I have been engaged now about 20 years, and I had one dispute; and I discharged every workman belonging to the trade union who wished to dictate the terms on which I was to employ my men.

2051. Since then have you been more fortunate, and have you had a more intelligent set of men who have been equal to the mechanics in America?—They have not been more intelligent that I know of than they were before.

2052. You stated that you were very much pleased with the machinery you saw at Messrs. Adams & Deane's?—Yes.

2053. Do you know at what price they produced the pistol at last?—I do not.

2054. Do you know at what price they sell it?—No, I do not; I did ask the price of them, but I really do not remember; they have different sizes; what the particular price is I cannot state.

2055. Mr. *Newdegate.*] You have mentioned in the course of your evidence that you have been the means of introducing a uniform system of gauge for taps and screws for marine steam engines?—Yes.

2056. And that you have induced the Royal Navy to adopt that uniform plan?—Yes.

2057. Are all the machines made by the Admiralty to which that uniform system of gauge is applied?—No.

2058. Has it become general throughout the whole of the trade of this country?—It has.

2059. Then it is not an unreasonable inference that the same uniformity of system of gauge might be extended in the gun trade throughout a great number of private firms?—No doubt it might.

2060. You have mentioned, that you think that additional machinery might be employed with advantage, for making and for gauging barrels?—Yes.

2061. If I understand you rightly, that machinery is as yet untried for that purpose?—Yes, it is.

2062. In short, it has not yet been applied to that purpose?—It has not.

2063. Then the first application of it must be in some degree in the nature of an experiment?—You can hardly say that it is an experiment, when you have machinery employed for similar purposes; I should not consider it an experiment at all. I am as certain about it as I can be of anything.

2064. Can you be confident that this machinery applied to the making of a gun barrel would be capable of doing the work at once, without any need of alteration, or adaptation subsequently?—The machinery that I allude to now, that is, for turning a barrel, would do so.

2065. You stated that it would cost 5,000 *l.* to adopt machinery for making stocks?—For the 16 machines that I saw. But that is merely a rough estimate.

2066. How many stocks would a machine turn out per day?—The longest operation of one machine was 8 minutes 35 seconds; some of the machines were only

only a few seconds; one was, I see, seven; so that the number of machines would have to be increased in proportion, supposing you wanted to turn out a greater number.

2067. You would have to increase the number of machines, would you not, in order to increase the production?—Yes; I may mention that, when we were there, 1,400 muskets were being made per month; that is about the quantity, I believe, that this machinery would do.

2068. About 1,400 muskets per month?—Yes.

2069. Was that accomplished by a single set of machines costing 5,000 *l.*?—Yes; but you will see that some of the machines would do a great many more than that. One machine was 8 minutes 35 seconds; another 5 minutes 28 seconds; and another 4 minutes 11 seconds; and if a greater number of those three machines were introduced, three or four times the quantity of work would be done by the other machines.

2070. Is there anything to prevent private firms from adopting that machinery?—Not any; and I think that they might do it with great advantage.

2071. You think, do you not, that some amount of hand labour would still be required in finishing a musket?—Undoubtedly.

2072. Messrs. Adams & Deane, I think you stated, have adopted a rifling machine, which is a great improvement?—Yes.

2073. That is a private manufactory, is it not?—Yes.

2074. Having a large acquaintance with machinery, and being so extensively employed as you have been in making machines, are you aware of any important improvement in machinery which has emanated from a Government establishment?—Yes.

2075. What has it been?—I think the block machinery that was made at Portsmouth.

2076. Was not that invented by Mr. Brunel previously to its being adopted by the Government?—I hardly think it was; Messrs. Brunel and Maudsley, I think, were the two parties who made that machinery.

2077. Was Mr. Brunel a Government officer at the time that he invented that machinery?—I think not; I am not able to say.

2078. Do you consider that gun making requires a special knowledge with regard to the application of the materials required for that trade?—Undoubtedly.

2079. Perhaps, compared with similar trades, that knowledge is required in a special degree?—Yes.

2080. That may be attributed to various causes, the expansion of metals, the risk of explosions, and so forth, may it not?—Yes.

2081. In that particular department, accurate knowledge acquired by experience is of great value, is it not?—No doubt.

2082. Would you recommend the Government to undertake at once to manufacture entirely for themselves, on a scale equal to producing 500 muskets a day?—I would not, but I would recommend the Government to have an establishment as perfect as could be made, to produce a limited number, and to set an example to other gun makers.

2083. You do not think it would be advisable on the part of the Government to undertake to manufacture so extensively as to produce 500 muskets per day?—I do not.

2084. That opinion is based upon your extensive experience of the risks and circumstances attending the establishment of a manufactory to be worked by machinery?—I think that the Government is much better served in having marine engines made, not only by themselves, but also by other makers, such as Penn and Maudsley, and calling in the talent of other people; I think it would work better for the country if the Government had an establishment to do part of the work, and also to give work out to respectable manufacturers.

2085. You have stated that there was greater identity of parts among a number of American muskets produced by machinery, than among an equal number of such arms as are at present supplied to the Ordnance?—Yes.

2086. But if a system of machinery were adopted with uniformity of gauges by private firms, as in the case of the marine steam machinery, might not similar uniformity be produced by private firms in this country?—Certainly.

2087. You did not speak with any confidence, I think, of the parity in quality of the American musket to the English musket?—I stated it as my

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opinion, that there was a greater identity in a number of parts; but with regard to finish, I think it is in favour of the English rifle that is now manufactured.

2088. Mr. *Muntz.*] You stated, did you not, that you were both an engineer and a tool-maker?—Yes.

2089. Did you hear Mr. Anderson's evidence the other day?—I did not.

2090. Did you hear Mr. Nasmyth's evidence?—I did.

2091. Did you hear Mr. Nasmyth state that the parts of a gun made according to the proposed plan of the Government, by machinery, would fit one another without any hand labour, supposing all the parts mixed together?—I did.

2092. Do you think that a correct view?—They would fit, there is no doubt.

2093. But how would they fit?—Badly, I think.

2094. Do you ever perfect a machine, or a tool that is made by machinery, by hand labour afterwards?—Yes.

2095. Why do you do so?—Because wherever we want great perfection of parts we must do it by hand labour; there cannot be a more striking instance of that than what I have mentioned to-day.

2096. You really think that if you want a machine or a gun to be a perfect piece of work it ought to be finished by hand?—Yes.

2097. Even supposing the parts to be first cut out by machinery?—Yes, I understand the Honourable Member now to ask me whether that is my opinion, if I want great perfection.

2098. Have you seen the Minié rifle that is now supplied to the Government?—Yes.

2099. Have you examined it, with regard to the perfection of it?—Yes.

2100. What do you think of it?—I think it a very well made instrument.

2101. Did you minutely examine the American musket?—Not so minutely as the English one.

2102. Did you examine it minutely enough to be able to make a fair comparison between the two?—Yes; but in speaking of the rifle, the Committee must understand that I do not speak of the finishing of the bore of the barrel; I have only examined one barrel, and that was not, in my opinion, so true as it ought to be.

2103. What was the matter with it?—It was not of the same diameter throughout its bore.

2104. Is it desirable that it should be of the same diameter throughout its bore?—I believe there are different opinions about that, but there ought to be a uniformity, whatever the shape of the bore of the barrel is; if it is a cylinder, it ought to be of the same diameter from end to end, and if conical, it ought to be regular.

2105. Did you find it to be a cone?—I found some parts conical, and some parts cylindrical, and some parts that were conical, larger than other parts.

2106. Did you try it with your plugs?—Yes.

2107. Do you think that those short plugs would prove the straightness of the whole of the barrel?—No, it would prove its diameter; if they were made long, it would prove the correctness according to their length.

2108. You are of opinion, I presume, after all the nicety that may be arrived at with plugs, that the barrels must be looked through to ascertain their straightness; have you heard that the Government have made any complaint as to the correctness of the bore of the barrel?—I am not aware that they have.

2109. When you were in America did you see the men at work generally throughout a manufactory there?—Yes.

2110. Did you see hand men as well as machine men?—Yes.

2111. What class of labourers were employed?—I think a high class of labour.

2112. Were there many boys employed?—I did not see one at Springfield.

2113. Were they finished workmen at their business?—Yes, they were; whether the men attending the machines were mechanicians or not, I cannot say, but they were men of great intelligence.

2114. Did you ascertain what their wages were?— No, I did not know what their wages were at Springfield.

2115. You have been at Colonel Colt's manufactory, have you not?—Some time ago.

2116. Did

2116. Did you go all through it?—Yes.

2117. Did you examine the separate machines at work?—I merely walked through.

2118. Can you give any opinion as to the goodness of the quality of the machines?—I think they were well made.

2119. What do you think of the kind of labour that he employs; is it, in your opinion, very common labour?—I believe he has had a change; it was just as he was starting that I went through.

2120. What was the class of workmen you saw; were they proficients in their trade, or were they men from the plough-tail?—I believe he had not plough-tail people about him then.

2121. With regard to Colonel Colt's pistols; do you think that, made as they are now, if you threw a quantity of parts into a basket, they would all make up together without any selection?—I do not think that they would; nor do I think it is possible in an American musket, although there is such care taken, that the parts could be taken indiscriminately and put together without considerable trouble; for this reason, that one stock is of softer wood than another, and it will warp differently; and, therefore, though it may be true to-day, in a year's time you will have one stock vary in one direction, and another in another.

2122. Suppose you took two stocks cut with the American machinery, and two barrels of precisely the same size, one stock being of hard wood and the other of soft, when the barrels come to be stocked up, will they fit?—They could not fit the same.

2123. If one fits, the other cannot?—They both might be fits, but the one would fit better than the other.

2124. I suppose you mean that all the stories about mixing up the materials, and putting them together indiscriminately, comes to this, that they would fit in a way?—I think this, that on a field of battle, if a great number of muskets were disabled, made by the American mode of manufacture, that the armourer would be able to put a greater number of parts together; whereas by the mode of manufacture in this country he could not do that.

2125. Do you think that he could take them without any sort of selection?—No.

2126. He would be obliged to sort them to fit them, would he not?—Yes.

2127. Would a soldier be able to fit them himself?—There would not be many that would be able to fit them themselves.

2128. I presume your opinion is, if the parts of a musket were so fitted together, they would not be what we call fitted work; they would go into their places only in a way?—Yes.

2129. Do you think that such muskets being loaded with a heavy charge, and being knocked about in hard service, the work so put together would stand?—Yes, I think it would, but not so well.

2130. You cannot make a comparison between the durability of one fitted as well as our rifle is, and the other the parts of which are produced by machinery?—A gun is much more durable the better it is fitted.

2131. Do you think that the work in Colonel Colt's pistols is as good as that in the Minié rifle?—No, I do not consider that the parts are as well finished.

2132. Speaking of the application of machinery for stocking, you stated that a gun could be stocked in so many minutes; what is your impression as to the average time in which they are stocked by every man there?—I was asking Colonel Ripley about the time. I saw that some operations were very quick, and he said he really did not know, but he would have the time taken down, and let me know. I said that, with his permission, I could take the time, and we set to work. The stock, machinery and everything was ready, and the time that I have mentioned was the shortest possible time, I have no doubt, in which the thing could be done.

2133. Have you any idea of what their average time is of doing the work?—Not more than this: that it was stated that they were then doing 1,400 muskets per month.

2134. That is 350 a week; how many machines had they to do that?—One of each kind, and the longest time occupied in a single operation was 8 minutes, 35 seconds.

2135. For one machine?—Yes.

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2136. That is, working as closely as you did, for the sake of experiment?—Yes.

2137. You do not say that they would work at that rate constantly?—Perhaps it might be right to take nearly double the time as the average time.

2138. What is your opinion as to ordering guns in parts, or ordering the whole gun, instead of guns being contracted for as they are now; what is your opinion as to the principle of ordering a finished gun?—Decidedly, I should order the finished gun, and make the parties responsible for it.

2139. For the whole?—Yes.

2140. You do not advocate the principle of dividing contracts as they are now divided?—Certainly not; it was all very well, when the manufacture was first established at Birmingham, to have a division of labour, and each to do a certain part; but the times are different now, and it is absurd, I think, to pursue that plan.

2141. From what you have seen of the making of a gun, have you any means of ascertaining the probable cost of a gun made in England by machinery?—Not supposing it to be made by machinery, I have not gone into that.

2142. You have not made up your mind as to the quantity of skilled and unskilled labour that would be necessary to make it?—No.

2143. You stated that there were 16 machines used for stocking in America?—Yes.

2144. You stated that you thought them of the value of 5,000 *l.*?—Yes.

2145. Can you form any idea as to the number of machines that would be required to do all the work that can be done by machinery?—No.

2146. Taking the bayonet, the barrel, the stock and everything?—No, I have not gone into that.

2147. You cannot form an estimate of what the outlay must be to manufacture so many guns per week?—No.

2148. Do you think, supposing machinery to be adopted in the way in which Colonel Colt has used it, that the Minié rifle might be made of the same quality that it is now made?—Yes; but it would have to be finished by hand; the quality would depend entirely upon the finish after it came from the machine.

2149. Upon the manual labour?—There is good work from machines, and bad work from machines, as in hand labour; if good work came from machines, less hand labour would be required.

2150. You know a great deal more about lock-making, I presume, than about gun-making; have you seen locks made by machinery?—I should say that the barrel was more in my way than the lock, and I think that machinery is more applicable to the making of a barrel than it is, perhaps, to a lock.

2151. Do you think that the plate of that lock, which is of an irregular shape and of small substance, having been worked by machinery in the way in which it is said to be worked, will be in the same shape when it is hardened as it is in the soft state?—It cannot be.

2152. Will it require altering afterwards?—Yes.

2153. How are those parts to fit if they are to be hardened and then altered; how are they to be brought from the machinery to fit one another; how can they fit?—I never heard that anybody thought of making the parts right by machinery after they were hardened.

2154. Suppose they are made right before they are hardened, and suppose they are hardened and altered in many respects in the process of hardening, can you believe that such materials thrown promiscuously together will ever fit as the parts of a gun ought to fit?—No, they cannot.

2155. Will all the pins turn out exactly to fit the right places?—No.

2156. Suppose that they did not turn out exactly at the right places, do you think that the barrel, lock, and stock could be screwed together so as to make them perfectly durable?—No.

2157. Would not the trigger very often come in its wrong place, and not act properly upon its lever?—Yes.

2158. What do you think of making the mainspring by machinery; will that answer?—I should not attempt to make everything by machinery.

2159. Or the scear spring?—Yes.

2160. Would you make the cock by machinery?—If it was stamped out in the way in which it is frequently done, I should not attempt in that case to use machinery; if it was forged, then I should use machinery to assist.

2161. If

2161. If stamped out well, you would consider that the materials might be finished cheaper by hand than by machinery?—Yes.

2162. You have been asked whether you think, if machinery is used, it could be employed as well by an individual as by the Government, and I think your reply was that it might be better employed?—I think it is desirable to employ both.

2163. As a sort of check upon other parts of the world?—Yes, it would serve that purpose.

2164. Your opinion is distinctly that the Government, under proper circumstances and proper regulations, would get principally supplied by contractors, and better than by their own manufacturers?—One would be a check upon the other; I do not know that it would be done better; that would depend upon the management of the Government manufactory.

2165. Supposing the Government established a manufactory like your own, to make tools, could they work it as well as you could?—I do not think they could.

2166. Colonel *Boldero.*] Were you employed by the Government to inspect the establishment for making muskets in America?—I was not sent over by the Government for that purpose.

2167. Was it one of the conditions of the Commission that you were to go to inspect the making of small arms?—No.

2168. What induced you to go to give your attention to that subject?—In the neighbourhood of Springfield there are other important manufactures, and I went there as a matter of course.

2169. Did you ascertain the price of a musket in America?—No.

2170. Did you ascertain the price of a musket made by machinery?—No.

2171. You saw a musket?—Yes.

2172. Was it a rifle or a smooth barrel?—A smooth barrel.

2173. How long was the musket supposed to last?—I am not aware.

2174. Did you look at the American walnut wood?—Yes.

2175. Is it not a wood softer and heavier than the walnut of Europe?—I am not aware what the difference is in specific gravity.

2176. You did not go into those points?—No.

2177. Are they not all points that enter very essentially in making a musket?—No doubt they are; my attention was not particularly directed to the manufacture of fire-arms; if I had been there now, it would have been very different.

2178. Colonel *Dunne.*] You stated that the parts of a musket made in America were not so good as they are here; did that apply to the materials or to the workmanship?—It applies to the workmanship; I consider that the American musket is better turned out of the machines, those parts that can be done by machines, than they are here, but that the hand labour here is superior to that in America.

2179. Do you think that the iron is good in America?—I could not from memory make an exact comparison between English and American iron.

2180. You stated that you thought the Government would be justified in having a manufactory merely to check the contractors?—I think that on other grounds it would be desirable for the Government to have a manufactory, namely, that experiments may be made in order that the system of manufacture may be established on correct principles. No doubt, improved machinery requires to be applied to that particular manufacture, and I think that it would be proper for the Government to take the lead in that respect.

2181. Are you aware that there have been many difficulties and breaches of contract which have been injurious to the public service for some years in the Ordnance department?—I have no knowledge, but general rumour.

2182. Have you any idea whether there is any probability of private manufacturers getting up this arm in a way similar to the Americans, by machinery?—I think it is likely they will.

2183. Do you think that the demand from the Ordnance would be sufficient to induce them to do that?—There is a great demand for guns independently of the Ordnance.

2184. As they have not hitherto set this machinery to work, and are only now talking of it, how could the Government expect to obtain the supply of arms that

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that they wanted from the manufacturers?—I think it would be well to spur them on by having a manufactory of their own.

2185. Mr. *Muntz.*] How long do you think the Government will take to produce arms after they have erected an establishment?—About 12 months.

2186. Do you think that they will turn out any quantity in 12 months?—I am not able to say.

2187. You think that they will begin in 12 months?—Yes.

2188. With a complete arrangement of machinery to do all the parts in the way supposed?—Yes; if great exertion was made they might have some of it in work.

2189. You are aware that the iron required for the Minié rifles must be exceedingly good; if not, the barrels will not be of the quality that the Government will receive?—Yes.

2190. Do you know the cost of the iron?—I think it was about 22 *l.* a ton.

2191. Do you know how near the Government require to have barrels bored for gauge?—I believe they attempt to work to the thousandth part of an inch.

2192. And that they consider near enough for their purpose?—I do not think that they have had any means of working nearer.

2193. Would it be any advantage that they should work nearer?—Yes, I think so.

2194. Do you think that the barrels do not go nearer?—I would make them go nearer.

2195. Have you ever tried a Minié rifle?—Yes.

2196. Have you found any defect in it as to correctness of firing?—I do not feel myself qualified by firing in the usual way.

2197. You were asked whether a barrel could be turned out of a lathe finished without any filing, and you said "Yes, that is well known;" but do you think it would be advissble to turn a barrel out of a lathe without any draw-filing?—I am informed that it takes a better colour by draw-filing it.

2198. Do you know whether the Government would receive them from the lathe only, without draw-filing?—I am not able to say.

2199. Do you think that any great advantage would be obtained if they would do so?—I should prefer not draw-filing the musket.

2200. Do you think that draw-filing alters the regularity of it?—Yes; it seems to me to be useless, unless it is necessary on account of the colour.

2201. Can you form any idea of what amount of expenditure would be required by individual manufacturers to make a series of machines for completing, as far as is desirable, the Minié rifle?—One set of machines to make the smallest quantity?

2202. Yes?—No, I am not able to say.

2203. You still retain your opinion that in every case of machines being used, the final work, to make the work perfect, must be hand labour?—Undoubtedly.

2204. Colonel *Lindsay.*] You stated, did you not, that there must always remain a certain amount of manual labour to be done, in finishing the different parts of a gun?—Yes.

2205. You stated that you heard Mr. Nasmyth's evidence; do you agree in the opinion which he expressed, that "with properly contrived machinery you might reduce the employment of manual labour, I may say down to zero?"—I do not agree in that opinion.

2206. Do you think that he goes too far in that opinion?—Yes.

2207. At the same time is it your opinion that in consequence of the reduction of manual labour in the employing of machinery, muskets would be produced to a very great extent at a considerably reduced price?—Yes, the greatest reduction appeared to me to be in the employment of machinery for the stock. I would like to make a remark as to the finishing by hand; I believe there is no one who takes greater pains to finish by machinery than I do; I sent for this piece of work (*exhibiting the same*) since I have been in London; this is just as it leaves the machine, which is attended by an intelligent labourer; I am quite sure that in the case of a musket and any other cases where we require great accuracy, we must do it by manual labour.

2208. That is for finishing, is it?—Yes.

2209. After the hardening?—Yes.

2210. Were you present when Mr. Wallis was under examination?—Yes.

2211. You

2211. You have been asked some questions as to the different parts of a lock fitting?—Yes.

2212. Was Mr. Wallis present with you when you were at this manufactory in America?—No.

2213. Mr. Wallis states that he saw the lock, the barrel, and the furniture put into a gun, each part being taken indiscriminately from a heap, and that he saw no choice made on the subject; do you think generally that if an army was in the field with those component parts of the lock in the possession of the sergeant-armourer, that those parts could be taken and fitted without much difficulty into the locks of different guns?—I think if an armourer had 100 pieces put before him, and he took them asunder and separated all the parts, he would be able to find out of those parts a good number that could be fitted without much difficulty into the locks of different guns out of the 100, in consequence of the correctness with which the parts are made by machinery, and I think that would be a great advantage.

2214. Therefore the sergeant-armourer, assisted by men trained under him, would be able easily to supply deficiencies caused by the wear and tear of the musket on service?—I do not understand the Honourable Member to mean that a great number of old muskets worn out are to be tried to be put together, but in the case of accidents, or a battle.

2215. Yes?—Then I think there would be a great advantage in making the parts as correctly as possible by machinery.

2216. With a slight amount of manual labour under the sergeant-armourer and his assistants the thing might be accomplished?—Yes.

2217. Mr. *Muntz.*] Did you ever take the pains to take to pieces one of those Government rifles, to see how nearly the parts agree together?—I have taken it to pieces to some extent.

2218. Did you ever compare two of them?—To some extent.

2219. Do you know that all the parts now worked by hand are filed to gauge?—Yes.

2220. Then why should they not fit as well as those made by machinery?—I think there may be a great improvement in that respect; I presume the Government send out different models, and they cannot, by the present system, send them out alike.

2221. Have you ascertained how nearly the parts, all being worked to a pattern, fit into the pattern?—I have tried two rifles, and the lock that has fitted into one would not go into the other at all.

2222. That has reference to the wood part?—Yes.

2223. Then comes the question how far they have been altered in the hardening?—Yes.

2224. That might be the case with regard to those sent out of the machines, might it not?—Yes; still there must be a great difference in the amount of labour without the aid of machinery to make all the parts correct.

2225. Colonel *Boldero.*] In the course of your evidence, you have, I think, condemned the present system under which the Government make large contracts for muskets?—Yes; I think that they would get much better work, if they made a contract with one responsible individual.

2226. Then you would wish to have the contracts sent out, allowing the trade to find their materials, except the stock, and to supply so many per month?—Yes.

2227. Do you think that that would be more advantageous both to the Government and the trade than the present system?—Yes, I do.

2228. Mr. *Newdegate.*] You stated in answer to a question put by the Honourable Member for Birmingham, that in your own business you would not fear the competition of a Government establishment?—Yes.

2229. By that are the Committee to understand that the supply from your own establishment and from the Government establishment are to be to an open market, so that the public would have to decide between the two?—I merely said that I did not fear the competition of the Government, as I do not fear any competition at all.

2230. In supplying the public?—Yes, in supplying anybody.

2231. Lord *Seymour.*] Are you well acquainted with the Ordnance rifle musket?—Yes.

2232. Have you formed any opinion as to the price at which such a musket

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can be produced by the aid of machinery?—No, I have not; when I say that I have seen the Ordnance rifle, I have seen it and examined it, but I have never had my attention before this time directed particularly to the manufacture of fire-arms.

2233. Have you visited many of the Government establishments for different manufactures in this country?—Yes.

2234. You visited those also in America, did you not?—Yes.

2235. Having visited those in this country, has it led you to form an opinion that the Government manufacturing is an economical system generally?—Generally speaking, my impression would be that it is not, but there are exceptions, and the great exception, I think, in America was this particular manufactory at Springfield; there may be exceptions here; for instance, the carriage department at Woolwich is conducted exceedingly well; but as a general principle, I think it is better for the Government to depend upon competition.

Mr. *Charles William Lancaster*, called in; and Examined.

Mr. *C. W. Lancaster.*

2236. *Chairman.*] WHAT is your occupation?—A gun manufacturer.

2237. How long have you been in that trade?—Twenty-four or 25 years.

2238. Do you manufacture only sporting guns?—I manufacture principally sporting guns of a high description, but I take contracts also for military arms.

2239. Have you ever had a contract from the Board of Ordnance?—Yes, I received the last contract, I believe, in May 1851.

2240. What was the contract for?—For 350 Cape carbines, that went to the Cape of Good Hope.

2241. What were the terms of that contract?—The terms of the contract were, that they were to be completed upon the usual Ordnance terms, within a given time, for so much.

2242. Was it a contract for a complete musket?—For Cape carbines; little short double carbines, intended for the Cape cavalry, and I believe that one of the light regiments was armed with them.

2243. Were you to deliver them complete?—Yes.

2244. What course did you take to fulfil that contract?—I contracted with Messrs. Lacy and Reynolds to set them up for me, and they employed all the force that the country afforded to procure the necessary materials.

2245. Did you pursue precisely the same course that the Ordnance pursue?—Precisely, except that the Ordnance do it themselves, and I employed Messrs. Lacy and Reynolds.

2246. Did you fulfil your contract within the time?—No, unfortunately not; it took me longer than I could have imagined; I was eight months fulfilling the contract, and of that period between six and seven months elapsed before I could procure the whole of the barrels.

2247. Mr. *Walpole.*] Within what time had you contracted to complete them?—Within six weeks and two months they ought to have been completed.

2248. Lord *Seymour.*] To what do you attribute this failure in obtaining the barrels?—The facts will explain themselves. The contract for 350 carbines was divided between all the barrel makers who could produce that kind of arm, some of the contractors for the barrels finished their contract in a little more than three months; others took nearly seven months; there was not an equal amount of organisation of labour in the several places where the different portions of the contract was done.

2249. *Chairman.*] Did you pursue the usual method for fulfilling your contract?—Precisely.

2250. You were merely a setter-up and finisher of that arm?—Were I entirely a military gun maker, and what is termed a contractor, I should be, more strictly speaking, a setter-up and finisher of the arm, because I should procure the materials from the different manufacturers, from the barrel makers, the lock makers, the furniture makers, and so on, and set up and finish the arm myself.

2251. Is that the usual practice of military gun makers?—Yes, the usual practice.

2252. Does that system involve the use of hand labour to a large extent?—To a very large extent.

2253. Could

2253. Could it be otherwise?—It could be done otherwise to a very large extent.

2454. To what extent and by what means?—I entertain no doubt that machinery could be very largely and appropriately introduced into the manufacture of arms, more especially in those portions involving wood work; the stocking, screwing together, and setting up, all that might be very largely done by machinery.

2255. To what extent is machinery used now?—It is principally confined to the manufacture of barrels, and to a certain extent to the manufacture of locks.

2256. Have you any considerable acquaintance with machinery?—Perfectly so.

2257. Have you ever designed machinery yourself?—On several occasions; for the production of ellipses in interior surfaces, and for any object, no matter what; also for the production of rifles without grooves.

2258. Do you know to what extent machinery is used now for making gun locks?—Yes, there are what are termed circular grinders, used in cutting the tumbler, and circular grinders are used in cutting the curve of the scear, also ovals; where there is required a perfectly true hole vertical with the plane of the lock, the instrument will then drill a perpendicular hole in the object to be perforated. Suppose it the swivel hole in the tumbler; putting the oval on the surface of the tumbler, and then placing a cylinder drill within the oval, you drill a hole perfectly true with the plane of the top of the tumbler.

2259. If you were to take a contract for 20,000 Minié rifles, how soon could you supply them?—I would not undertake any such contract to do them in six months, according to the pattern of the present arm.

2260. Why not?—Because I do not think I could fulfil the contract.

2261. Will you state your reasons for thinking that you could not fulfil the contract?—I think that the present condition and the arrangements of the trade altogether would not permit, within six months, 20,000 arms equal to the present pattern to be completed; you would not be able to organise a sufficient amount of the requisite labour to do it in the time.

2262. Could you suggest any means by which the country could be secure of obtaining a large number of arms in a limited time?—Unless you aggregated a sufficient amount of labour, there appears to be but one method, and that is to have a sufficient force of machinery to enable you to produce the greatest quantity in the least possible time.

2263. How would you accomplish that object?—If you resort to machinery you must, of course, have a sufficient establishment, and a perfect arrangement of parts in all respects, a perfect arrangement of machinery, and you must have well-considered and digested plans to produce every part that can be produced by machinery; and by that means you would be rendered independent upon any sudden emergency, and go on producing at the highest rate of which machinery was capable; but, on the other hand, if you determine to employ hand labour, you must aggregate your labour up to any given amount of production to any extent you please, which can be done, and then keep up your annual supply, so as to employ that amount of aggregated labour; these are the only methods that I can suggest.

2264. Would that involve the necessity of keeping a large number of arms and materials in the Government stores?—Yes; in the case of aggregated labour it would.

2265. What saving might be effected by the introduction of machinery into the manufacture of small arms?—I think considerable; I have not gone thoroughly into the question to estimate every possible contingency; but I have not the least question, from what I have reason to know, that a very considerable saving might be effected if machinery were judiciously employed to the fullest extent.

2266. If the arms were made by machinery, would they be as efficient and as well made as if they were made by the present mode?—I think that a perfectly efficient military arm might be produced, in which a large amount of machinery should be employed together with hand labour.

2267. Would they be equally efficient?—Equally efficient; decidedly so.

2268. Would they be as highly finished?—If left by machinery entirely, certainly not.

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2269. For all practical purposes would they be as efficient?—I should not recommend certain portions of a gun to be left from the machinery entirely; but for all practical purposes, with a judicious amount of machinery, that is, the application judiciously of machinery as far as possible; I do not say that you should employ machinery in every part exclusively; then the gun would in every respect be efficient, and would be equally efficient, but not so highly finished, I think.

2270. Could you produce by machinery an identity of parts of the musket?—Identity would be one of the great advantages of machinery. You would have greater identity than at present.

2271. Would not that identity be liable to be lost in the hardening and tempering?—No doubt the hardening and tempering would modify it only to such an extent as that, in case the assistant armourer on the field of battle, if he had a number of parts given to him, at least after the battle, when he had tools to repair the arms, could adapt. Suppose the tumbler were a little too large for the axletree of the hole of the lock plate, it might be easily reduced by the armourer to a size less, so as to go into the lock plate, and every part in proportion.

2272. Do you know how many arms have been exported from England to the United States in the last three years?—From memory I should say about 34,000 arms of all descriptions on the average of each year.

2273. Of what class?—A very large proportion of them consist of double fowling pieces, termed birding guns; they consist of various kinds; a large proportion are double fowling-pieces of various descriptions, some of a low price and some of a higher; the majority are of a low price.

2274. Mr. *Newdegate.*] Your special business is of the highest class, is it not?—Yes.

2275. Your work commands the highest price, does it not?—Yes, it does.

2276. In what way is your superiority attained?—By employing the highest class of skilled labour; keeping up a regular establishment of skilled labour.

2277. That is for the finish, is it not?—Yes.

2278. And the difference between a 3*l.* gun and your best gun in price purchasers are induced to pay on account of the superiority of your guns in finish? Just so, by the work all through, every portion of it. There is a different class of labour, and a different quality of labour, and a different quality of material.

2279. In short, the labour which is commonly called the finish, is superior in your guns, and worth more money?—And the material also, in every part.

2280. May I ask you whether the Government view may not be so conducted as to enhance the price at which it would be possible for private manufacturers to supply the Government?—There is no doubt; according to the stringency of the view, so would the price of the article be regulated.

2281. You have stated that you took one contract; are you in the habit of taking Government contracts?—I am not in the habit generally of taking Government contracts.

2282. Have you taken more than this one contract for 350 carbines?—Not for furnishing the whole arm.

2283. It would not be possible for you, would it, in order to complete so small a quantity, to employ any but the military gun makers?—It would not answer my purpose to make the materials for so small a quantity.

2284. Are you best acquainted with the London trade or the Birmingham trade?—I should not understand my own trade unless I was acquainted with both.

2885. With which are you best acquainted?—With my own business; particularly with the finishing business for fine sporting arms; the London trade.

2886. When you stated that you thought you could not complete a contract for 20,000 muskets, I presume you foresaw the same difficulties as those which met you in completing the contract for the 250 carbines; would it be worth your while to make the materials for 20,000 muskets?—If I had the prospect of further orders, and of becoming an exclusive maker of military arms, it might be worth my while, but not for 20,000.

2287. That is a business in which you have not had the same experience as in the supply of the best arms?—No; I know the process of the manufacture perfectly in all its details, but I have not had the same experience.

2288. In short, your experience of Government contracts is limited?—It is limited.

2289. Would not the withdrawal of the Government supply from the present manufacturers tend to abate wages?—I am not prepared to answer that question; I have not gone into it thoroughly.

2290. You cannot furnish the Committee with a general impression upon that subject?—I cannot.

2291. Mr. *Geach.*] You stated, did you not, that a gun made by machinery, for all practical purposes, would be as good as a gun made by hand labour?—I think I stated that a gun upon which a large amount of machinery had been employed, not exclusively machinery, would be in every way as efficient as one made by hand labour.

2292. You stated, did you not, that the superiority of your gun consisted not in the particular finish of the gun, but in the quality of the labour throughout; what did you mean by that?—I said that it was the labour expended on the finish, and the material.

2293. Supposing that your very excellent guns were proposed to be made by machinery by some one else, should you be afraid of that machinery being brought into operation within a short time, so as to equal your guns?—I am not prepared to say that machinery would do it at all, to say that it would be equal in finish in every respect.

2294. Mr. *Monsell.*] What is the price of your guns?—Fifty guineas.

2295. Mr. *Geach.*] You are aware that some guns are made at 15 *s.* each?—Yes, perfectly so.

2296. And that those are exported largely?—Yes.

2297. You are aware that the Government require guns to be made at 3 *l.* 9 *s.*, or they give that sum for them?—I am not aware exactly of the price of the present pattern.

2298. Have you examined the present rifle?—I have.

2299. Have you seen any of those guns that I mentioned at 15 *s.* each?—Yes.

2300. Do you think that there is that difference in the quality of the two guns?—It is altogether a different thing; there is no comparison between them.

2301. Do you think that by machinery the gun of 3 *l.* 9 *s.* might be produced at a much lower rate?—I think there might be a large portion of machinery employed, and the cost of production would be materially lessened.

2302. Have you adapted machinery much to the guns you manufacture?—Yes, I have had occasion to do so.

2303. Have you found on such occasions, when you have invented machinery, that it has answered in the first instance perfectly?—Not always in the first instance.

2304. Have you not found that you have always had a great deal of difficulty to overcome?—Not a great deal; you may have to modify it if your principle is correct.

2305. Should you have confidence in expending 150,000 *l.* for the purpose of erecting a manufactory, that you were to depend upon at the end of 12 months for making 100 guns a day perfectly by machinery?—I should not positively depend at the end of 12 upon being able to do so, but within a few months of that; it might be a month or two more; you would be able largely to employ machinery in the manufacture of guns to great advantage, if you expended an adequate amount of money. If I were sure of a very large annual supply for a lengthened period, I think it would be a very good speculation.

2306. Do not you think that there is a sufficient amount of enterprise in the gun trade to lead to the expenditure of capital that would be prolific in production?—I think if you gave any one man a contract worth his while, he would be too happy to employ machinery.

2307. Do you think that the Government have any particular advantages over private individuals in the application of machinery?—I think that they would enjoy equal advantages, but no superior ones, to private individuals. It is a simple question in employing machinery, who shall pay for it.

2308. Mr. *Muntz.*] With regard to the 350 barrels which you said you had such difficulty in obtaining, of whom did you order them?—Of Messrs. Lacy and Reynolds.

2309. Do you know from whom they ordered them?—They divided the contract among a number of contractors.

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2310. Are you aware that the barrels were finished, and that they lay a great while before they were taken up?—I have Mr. Lacy's written statement of the dates upon which every one of those guns was sent up to him.

2311. I mean that they were lying in Birmingham, not taken up?—I am not aware of anything whatever that occurred there; I know nothing about it.

2312. You never knew that they lay for weeks without being taken up by those who ordered them, when they were finished?—I was not aware of that.

2313. Speaking as to your own manufacture, which is of the very best guns, what machinery do you employ in making them?—I employ machinery for boring the barrel, for turning the barrel, and for rifling, and for other purposes, for sighting, for instance, and everything connected with the guns.

2314. Is the stock made by machinery?—No.

2315. Or the lock?—No, not by machinery exclusively. I only employ those machines that I explained.

2316. Do you make locks at all from the beginning by machinery?—Yes.

2317. In your opinion, suppose you applied more machinery than you now do to the manufacture of your best guns, do you think that you could save much by it?—In the best guns not a very great deal; in fact, nothing in them.

2318. Have you any idea of what proportion you would save in making Minié rifles?—In making a large number, by a careful adaptation of machinery, I have no doubt that you would save from 50 to 60 per cent. in labour, principally in the wood work, and also to some extent in other portions of the metal work, and by stocking and screwing together by machinery.

2319. You do not do the stocking by machinery yourself?—No.

2320. Do you contemplate doing so?—No.

2321. If the machinery would do the work for a rifle so well, why should persons come to you?—For the simplest reason, that you never produce two guns alike; every man has his own fancy.

2322. Do you think that if all the guns must be made alike, you would succeed by making them all by machinery?—Yes.

2323. To what extent would you carry the machine work as to locks, and furniture, and so on?—The Committee will perfectly understand that I would like to see, wherever the establishment might be, perfect machinery used for stocking and screwing together.

2324. Would you have the locks all made by machinery?—To a larger extent than is done now.

2325. Do you know to what extent machinery is used now?—Perfectly.

2326. You would not attempt to finish them by machinery?—No.

2327. Do you think if the Minié rifle were to be made as now proposed, by machinery, the Government would receive the gun?—I am not aware; I have never seen the original proposal.

2328. Supposing that the proposal is, that the whole of the work done to the gun shall be done by machinery, do you think the Government will receive such guns?—There must be to a certain extent, no matter what manufacture you have, an amount of skilled labour employed to finish and put them together.

2329. Have you any idea what proportion of skilled labour would be required?—I should think 25 per cent., or from that to 30, would be enough with the proper adaptation of machinery.

2330. In what part of the lock would you employ skilled labour?—Admitting that the locks were principally made by machinery, the parts cut out and shaped, I should employ skilled labour to put them together, and I should employ skilled labour in putting the gun together, when the stock had been prepared for the barrel.

2331. Supposing a stock to be ever so well made by machine labour, will it not require a considerable amount of finished labour to put the barrel into that stock?—Not a considerable amount; a certain portion.

2332. Stocks vary in quality, do they not?—Yes.

2333. Does not that sometimes make a difference?—Certainly, but military stocks do not vary so much as you suppose, if they are properly desiccated.

2334. With regard to the manufacture of locks, do you think that any great saving could be effected by making all or a small part by machinery?—Not to so large an extent as in stocking and screwing together.

2335. Colonel *Dunne.*] At the time the 7th Dragoon Guards went out, you had a contract

a contract for carbines for them, and you gave a reason for not having the carbines ready when they were wanted?—Yes.

2336. What reason did you give, then?—I cannot tell; generally, to my friends, I simply stated that I could not get the material.

2337. Did you not say that there was some delay among the barrel makers?—I stated that I could not get the barrels from Birmingham, which was true, and I produced the date when I received them.

2338. You have stated that you would not like to take a contract for 20,000 stand of arms?—Yes.

2339. Do you think that in the present state of the trade at Birmingham it would be possible for the Government to procure 100,000 within a year?—That is a large question; I think that you could not get 100,000 arms of the quality and pattern of 1851 within a year, not if you employed all the workmen in England, Ireland, Scotland, and Wales.

2340. Are not the Government, then, driven to look elsewhere for a supply, after the difficulties that they have had to encounter in Birmingham?—I am not so thoroughly acquainted with the difficulties; I know that difficulties have arisen, and I have heard that considerable difficulty has been experienced in getting arms.

2341. What number of carbines did you find a difficulty in getting?—Three hundred and fifty.

2342. In what period were you to supply them?—Under two months.

2343. And you found it utterly impossible to do so?—Yes.

2344. Mr. *Muntz.*] Had you any difficulty in getting them viewed?—That was my contractors' part; I had a difficulty in getting certain portions viewed.

2345. How did you get over that?—By trial.

2346. With whom?—I believe one of the inspectors objected to certain portions, which I did myself, the rifling; I contended that it was correctly done, and it was agreed on by the authorities that they should be tried whether they were correctly done, and they were found to be correctly done.

2347. That, I suppose, you called vexatious viewing?—I thought that he had not a thorough knowledge of the subject at the time.

2348. Do you happen to know that that has been a very frequent practice of the Government viewers?—I have heard that it has occurred.

2349. Did you ever hear that materials are left for weeks together, the parties waiting, and that they are not viewed?—I do not know that as a fact; I have heard that there have been difficulties in the view, but of the nature of them I am not aware.

2350. Colonel *Dunne.*] Did you ever see the machinery used for making Colonel Colt's pistols?—No.

2351. Mr. *Newdegate.*] You stated that you did not think, in the present state of the trade, that a contract for 100,000 Minié rifles could be completed in a year?—Of the quality of 1851, I do not think they could; not in the first year.

2352. Do you that 50,000 could be completed?—I would not like to undertake contract for them myself.

2353. Do you think that others would?—It may be; in fact I have seen a written statement that there are those who would do so.

2354. May I ask you whether, after a period of very small orders, and an interval with no orders at all, it is not more difficult to complete a large order than to complete a large order when there has been a succession of orders?—No question about it.

2355. Have you heard that of late years the contracts for the Government have been extremely limited?—Yes, I have heard so.

2356. Would not that circumstance account for the present difficulty in completing contracts?—As I explained before, if you aggregate your labour to any given producing point, and you do not keep up the supply for the labour of that aggregate of men, you would dissipate all that you had done, and the labour will find other channels, and you will not be equal to any sudden emergency.

2357. Have you not heard that that is one great difficulty to which the London and Birmingham contract trade have been during the last two years exposed?—I have heard so.

2358. Mr. *Walpole.*] When you made that contract for the 350 carbines, did you specify the time within which you thought you could supply the Ordnance?—I did.

 2359. Then

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2359. Then I suppose you proceeded upon certain data in your own mind, or, upon inquiries, you thought that that was a sufficient time allowed you?—I had made prior inquiries, and I thought it was sufficient time.

2360. You only undertook to set up the carbines after the materials were furnished to you, and you failed in that, in consequence of some of the parts not being supplied to you?—Just so.

2361. That being so, would you be willing to enter into a contract with the Government again to supply a much larger quantity of arms, or the same quantity within a given time, when you found that you had been disappointed on the former occasion?—I should be exceedingly cautious how I did so.

2362. You would be constantly liable, would you not, to disappointment, from having to go to different contractors to furnish different parts?—When you depend upon many contractors, if one material is wanting, the whole stands still.

2363. That would be, in your opinion, an additional reason, as well as the uniformity of the parts, why you should make the Ordnance musket, rifle or gun in the same establishment?—I should always advocate that if you wish to produce any given material at the least cost, the whole of the manufacture should be under one directing power.

2364. Mr. *Muntz.*] When you first took that order for 350 carbines, were not they of the smooth bore?—Yes.

2365. Were not they afterwards ordered to be rifled?—Yes, they were.

2366. Did not that cause delay?—No; the last arm was delivered, rifled and all, within one month of the last delivery of material.

2367. You do not know what delay there was in the delivery of materials in the first instance?—No.

2368. Have you seen Colonel Colt's pistols?—Yes, I have.

2369. What do you think of the work of them, as compared with the work in the Minié rifle?—I do not think that there is any fair comparison between them. I think that Colonel Colt's pistol is the best repeating arm that we have.

2370. As to the finish of the work, the correctness of it, and the fitting of the work in that particular, is it equal to the Minié rifle?—Certain portions of the work are done as well as it is possible to do, the barrel, the bore, the general turning out of the cylinder, and the fitting; nothing could be done better. The lock is not so good, decidedly, as the Minié lock of 1851, and not equal in finish nearly.

2371. Are all the different parts of the pistol so well fitted?—Portions of it.

2372. Is it upon the whole as well fitted?—Not taken as a whole, compared with the finish of the pattern of 1853.

2373. Colonel *Dunne.*] Do you think that if there were fewer views of the muskets according to the Ordnance directions, it would be perfectly safe to take a musket with fewer views of the different parts, than there are now?—With regard to the view, I should be sorry to express an opinion of the number of times in which it is necessary to view; that would be naturally equal to the stages in which you produce the gun.

2374. Are you aware how many times they are now viewed?—A great many times; I do not know exactly.

2375. Do you think that one view of the whole musket would be sufficient to assure the Government of having a proper gun?—I do not think that would be sufficient; I think that every separate portion ought to be viewed, every main portion, and the parties held responsible for their particular branch.

2376. Colonel *Boldero.*] If the system that is now adopted of finishing the musket was lowered, would it deteriorate it?—Yes.

2377. But so far as wear and tear goes, combined with its destructive effects?—It would last a very long while, long enough for military purposes, if less highly finished.

2378. Would it last as it does now when the finishing part is very fine?—The majority of them would last as long as they do now.

2379. Mr. *Newdegate.*] You have stated that you would not recommend that there should be fewer views than at present; would there be any difficulty in viewing the different parts of a musket if they were all produced on the responsibility of one contractor?—Certainly not; not the least difficulty; say that I produce all these, I am responsible for them.

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2380. Mr. *Muntz.*] Suppose a man undertook a contract for guns in a finished state, and brought them to be viewed, and every part was examined by a competent person, why would not that be as good as if they were examined in parts?—Though the gun would be as good a gun, so far as the use is concerned, this is the objection: Suppose any one part was rejected, does not the Honourable Member see how much labour would be thrown away? As far as regards the quality, suppose a gun to be made, and all the different parts put together without a view, admitting that when viewed they are found to be correct, the gun would be quite as good, and, if possible, a shade better; but every part ought to be viewed; every separate part would have to be viewed when produced by machinery.

2381. You stated, that if viewed as a whole, and any part did not turn out to be perfect, there would be a loss of labour; if every part is to fit so beautifully when made by machinery, then that can never happen?—I have not seen the description of machinery; but if every part is made dead correct, and the materials all correct, admitting it to be not viewed, it is clear that the gun would be a perfect one; first you have perfection in the parts, and then, when they were put together, you must have them perfect.

Martis, 21° *die Martii*, 1854.

MEMBERS PRESENT.

Sir W. Molesworth.	Lord Seymour.
Mr. Monsell.	Mr. Muntz.
Mr. George Dundas.	Colonel Boldero.
Mr. Newdegate.	Mr. Geach.
Colonel Dunne.	Colonel Lindsay.

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Major *Robert Bruce*, called in; and Examined.

Major *R. Bruce.* 21 March 1854.

2382. *Chairman.*] YOU are an Officer in the Army, are you not?—I am.

2383. Were you engaged in the last Kafir war?—I was.

2384. During the Kafir war had you experience of Colonel Colt's revolver pistols?—Towards the latter part of the war they were introduced, I think; Colonel Colt's agents did not arrive till rather late in the war.

2385. What opinion did you form of the revolver, as compared with other pistols?—I consider it superior to any other that we saw there; very far superior.

2386. Will you state the grounds on which you formed that opinion?—Its accuracy, and in its not failing in what you require; I have never seen an accident with it, and I have never seen it, in discharging, become involved in any difficulty.

2387. Does it wear as well as other pistols?—Quite. I have also seen it fall into the water, and returned to its belt without being discharged, and afterwards, perhaps, after the lapse of some days, I have seen it discharged most perfectly without the least failure of any one of the barrels.

2388. Do you mean to say that the pistol was fully charged when it fell into the water?—Yes, fully charged, and some days afterwards it was discharged; it was merely rubbed over the exterior to prevent rust. The cap was not taken off, and without discharging it, it would be difficult to draw the ball; it went off perfectly. Another great advantage is in riding. I have ridden for hundreds of miles with a Colt's revolver by my side, and there is an impossibility of the powder shaking out. I have found the ball in other pistols very frequently loosen, but the advantage in Colonel Colt's revolver is the great purchase of the ramrod. There is such a power upon the ball, it forces it down in such a way that no other ramrod could do.

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2389. Do you attribute that accuracy to its being made by machinery?—I only speak of the weapon as I find it; I cannot say.

2390. Mr. *Dundas.*] Had you an opportunity of seeing Deane's revolvers tried?—I never had a Deane's revolver in my possession. I have discharged it. I have seen it in the possession of other officers, and it seemed to me to answer well enough in that respect. I have heard indeed friends of mine who had Deane's revolver, rather complain of the ball loosening.

2391. With regard to their missing fire, have you heard complaints made that those revolvers, made by Deane, frequently miss fire from some cause or other; you know that the principle is totally different in the two?—Yes, I have fired both frequently, but Deane's not so frequently as the other; I think that Colonel Colt's is very superior in every way to Deane's; in my opinion it is very much more simple; the simple fact of forcing the ball in so tightly is a great advantage, and I consider that the ball has literally no windage.

2392. Have you known any part fail, after frequent use?—I have once or twice seen a little difficulty, if the cap did not fit the nipple perfectly; I have seen once or twice the cap fall between the revolving cylinder and the breech, but that has been because the cap was not perhaps a proper cap for the nipple; when the cap fitted accurately I have not seen that.

2393. Have you known the component parts of the lock, a spring, for instance, get out of order?—I have never seen that.

2394. Mr. *Monsell.*] Did you find any advantage from the perfect adaptation of the different parts?—I have seen pistols of the same size taken to pieces, and the various parts fitted on to another with perfect ease.

2395. Lord *Seymour.*] What carbines were you supplied with at the Cape?—The Cape corps were supplied with a double-barrelled carbine, with Enfield on the lock; it is a carbine that I often carried at different times.

2396. Was that a good weapon?—Excellent as a smooth bore, and wonderfully well finished, but of course of less service since the introduction of the Miniés.

2397. What other Ordnance work came under your notice during your service at the Cape?—The Tower musket I have been used to all my life.

2398. What arm had you at the Cape; was it the Tower musket?—We had it the whole time, and a few Minié rifles were sent to us.

2399. How did the Minié rifles answer?—Wonderfully; I never saw anything like them, nor has anybody else, I think.

2400. Was it a good weapon?—Wonderful; beyond anything in its accuracy and range; the difficulty would be to say how far it will not carry.

2401. Did you find that the parts of the Minié rifles that were sent to you at the Cape were of good workmanship?—Perfect, I should say.

2402. You as a military man were quite satisfied with the weapon, as being well adapted for its purpose?—Certainly; I have seen the most expensive rifles sent out from England on the Minié principle, and not one of them seemed to carry so far, or more accurately, certainly, if so accurately; I have seen a 50 guinea rifle there made by a London maker, that did not seem to be at all superior, if so good, as the Minié rifle which I believe was made at Enfield.

2403. Do you know where the Minié rifle that you had at the Cape was made; was it obtained from a Government establishment, or from a contractor?—That I cannot say; I only speak of the Minié rifle that was served out to the 74th Highlanders, and to the Queen's, and to other regiments with which I have served; I have tried them against the old Lancaster, and the ball arrived at its destination in about one-half of the time; the rapidity of the flight is perfectly surprising.

2404. Did you find the parts of the lock give way; was there any fault in the workmanship?—None at all; wherever it was made it was excellent.

2405. Mr. *Muntz.*] You were quite satisfied with it, as you found it?—Yes.

2406. You found it shoot in every respect as well as a first class rifle?—Quite so.

2407. None of the officers complained of its not standing to its work?—Never; I have seen it discharged 30 or 40 times as rapidly as a man could load and fire. I was engaged over the Orange River against a great number of the natives, in General Cathcart's affair. I had very few men with me, but the Minié rifle astonished them at a distance, I think, of 800 or 900 yards; at first I began with the Minié, supported by a few muskets, about 150; and they retreated in the most rapid disorder.

2408. Have you ever found any difficulty in loading it after it had been fired many

many times?—Not the least; it loaded quite easily. It does not seem to foul so much as the old musket, and it has given perfect satisfaction.

2409. How long had you those pistols of Colonel Colt's in use?—I think during the last six months of the war.

2410. Have you ever made any experiments as to their quality by firing them repeatedly for a length of time?—Yes.

2411. How many times did you ever see Colonel Colt's pistols fired off successively?—I fired mine; I dare say I have taken 30 or 40, or 50 shots. When I have become tired I handed my pistol over to some of my brother officers; I do not know how many times, but I dare say they went on firing as long as they had any bullets; there was no complaint.

2412. What quantity had they?—A great number; the burghers, who are great judges of arms, every one had them that could afford it, they were so pleased with them.

2413. Were they more efficient in their operation, or more satisfactory in their use, than the Minié rifle as a rifle?—No; I think that both were very admirable weapons, and hardly to be improved upon. The Minié rifle seems a little handier, and lighter in the hand a good deal than a musket, and I consider it better finished.

2414. Mr. *Dundas.*] Do not you think that it would be a very great advantage to have an exact duplicate of all the different parts of the lock of a musket on service; so that, in the event of any part failing, you might replace without trouble that part which was broken?—Undoubtedly; there can be no question about it.

2415. Mr. *Newdegate.*] What is your practice; is not the armourer provided with several parts of a musket?—To a certain extent he is; I have seen him put them on at times. At Fort Beaufort I sent a musket in to be repaired, and he could not complete it.

2416. From not having the parts with him?—Yes. However, that is very far up the frontier, and of course rather a difficult position.

2417. That was from neglect on the part of those who ought to have furnished the stores?—It may have been so.

2418. Mr. *Muntz.*] Was it a musket or a Minié rifle?—A musket.

2419. Did you ever see one Minié rifle fitted with a part of another?—No, I never saw the necessity for doing so. I recollect an escort from Graham's Town to Fort Beaufort, with Minié rifles in its charge, being attacked by a strong body, and, having lost half their number, being forced to fall back, leaving some Miniés behind them. These Miniés were, for precaution, sent without nipples, but the Kafirs contrived to screw musket nipples into them.

2420. The musket nipple fitted the rifle, did it?—In that case it did; however, they fired the ball the wrong end outwards; they did not understand the mechanism of the turn, nor how to load it, and they were very much appalled at the result; and they said, "The white men kill us at so great a distance, but we could not send it 20 yards."

Mr. *Charles William Lancaster*, called in; and further Examined.

Mr. *C. W. Lancaster.*

2421. Mr. *Monsell.*] ON your former examination you spoke of the stock as the portion of the musket in which there would be the greatest saving?—Yes.

2422. Will you state whether you consider that machinery could be advantageously employed in the manufacture of bayonets and barrels to a greater extent than it is now employed?—Most certainly, it can be most advantageously employed. I cannot state anything clearer than its present position; machinery is to a great extent at present employed, and undeniably saves labour, and increases production; you have merely to enunciate a received principle, and you must save more labour, and further increase the production. A bayonet may be forged by Ryder's machine to a very great degree into a more perfect state than now, and it may be cut by circular cutters of the requisite curve and form, and it may be ground after it is hardened of the requisite curve and form: in every way, machinery can be more decidedly advantageously employed than now in the manufacture of bayonets, and it would then be a substitute of machinery for hand labour to a greater extent than at present.

2423. The present bayonet costs about 7 *s.* 6 *d.*; what would be the saving if machinery were introduced to make it?—I have not the least doubt that a

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perfect military bayonet, and answering in every respect all military requirements, could be made for somewhere about 2 *s.*, a few pence more or less.

2424. Could you state for how much the sort of bayonet that now costs 7*s.* 6 *d.* could be made for?—Not without going minutely into it; it would be within a few pence of the price that I have named; it would not exceed 2 *s.* 6 *d.*; I have no doubt of it.

2425. You stated that machinery might be advantageously employed to a greater extent than it is at present in making barrels; will you state your reasons for saying so?—I will give the reasons why: I have reason to know, but I cannot state the names of the parties who have shown it to me, that the process of rolling, which is at present used in making barrels, is capable of very great and wonderful improvement, and capable of a very large development, and it would create a very great decrease in the price of the article when finished; there are also other processes which at present are exceedingly laborious, and take a considerable time in the operation; the boring, setting, and straightening are also susceptible of material improvements. The present process of boring is by a square bit; after the rough boring is gone through, the fine boring is then performed by a square bit, accurately ground and cut; between one side of the bit and the barrel is placed a segmental piece of wood, termed a spill, extending the whole length of the cutting edge; as you put on the paper between the bit and the spill, you force the upper edges against the barrel, and cause it to take another cut. I have reason to believe that this system may be very much improved. In the one instance the cutting tool revolves, and on another system, which I have reason to believe would answer the effect of all the present process, the barrel itself would revolve between the points, and the cutting tool be stationary, something after that fashion (*describing the same*), and it would enable you to cut greater quantities in a given time, and effect the same nicety of workmanship that you do now; that combined with other tools to follow.

2426. Can you say what the saving would be in the price of a barrel, by carrying out your views?—I have no doubt that the saving on each particular barrel would amount to perhaps as much as half-a-crown; it is impossible to say the exact sum; but this I have no doubt of, that with regard to all machinery, all experience shows that where you substitute a perfect machine for manual labour, a large saving results; therefore I think I may say, knowing what I do, and having seen what I have seen, that the substitution, in barrel making, of more perfect machinery would result in a considerable saving.

2427. Have you got with you the different parts of a gun lock?—Yes (*producing the same*). With regard to this plate (*pointing to the same*), which is termed the lock plate, the Committee will perceive that this is a plain surface, with the exception of two little bosses, and the whole of it by well-known machines is capable of being reduced to a perfectly dead and true surface; the instances that Mr. Whitworth gave yesterday were cases in point. The holes are at present put in by ovals, drills formed to ovals, and the adaptation of the same machines, only to be moved by greater power than the hand, would effect the same purpose; the edges of the plate could be all arranged by revolving cutters following the pattern placed on the top, so that out of 1,000,000 plates, no one would differ from the original pattern, and you would ensure dead uniformity. Now as to the cock, which is considered difficult, assuming it to be forged by machinery, there is no difficulty in adjusting and cutting a given curve to pass here (*describing the same*); it will begin cutting, following up a given pattern placed on the upper side, and pass it all round in this way (*describing the same*), and cut every portion of that curve to any given curve that you require; then place the cock in another position, and you cut the other curves in the same way; this is a plain surface, and it can be cut with the greatest possible facility. There is no portion about the cock but what can be cut with great facility by machinery, and the adaptation of a known form.

2428. Can you state what the saving would be by carrying out your views?—My observation as to the last question would bear upon this; it would be impossible at the first blush, without having carefully considered and estimated the cost of the working of each separate machine, to say what would be the precise saving, but I say, generally, that in all instances the more perfectly you adapt machinery to any given purpose, as a substitute for skilled labour, the greater is the saving, and it must be so; you would derive, no doubt, a considerable saving from the more perfect adaptation of machinery to the purpose.

2429. In

2429. In order to finish a lock you must use some hand labour, must you not?—Some slight amount of skilled labour you would have to use; after the parts were cut by machinery they must be put together by skilled labour; every part of the lock is susceptible of the same observation; there is no difficulty in cutting the spring by machinery, and turning it, which is ordinarily considered a difficult operation.

2430. You consider that by machinery you could bring it to a very advanced state, and the amount of hand labour then would be very small?—I would wish to bring this to the notice of the Committee; if they will compare the two surfaces, here is the surface of a polished tumbler, and there is the surface of a piece of steel (*pointing to the same*), cut direct from the machine, without polishing; you would require skilled labour to reduce the one to the condition of the other, and adjust the parts so that they fit precisely, but it would be a very small amount of skilled labour in proportion to what it is at present.

2431. You spoke yesterday of your experience as a contractor; will you state to the Committee whether, in your opinion, the Government can with safety abandon the principle of viewing each of the materials composing a gun in the various stages, as they do now?—My impression is, that let who will construct the guns, whether contractors or the Government, the materials must be viewed in each of the separate stages; you cannot dispense with a proper and constant view.

2432. Mr. *Dundas.*] Will you look at that musket that is lying before you?—This is a musket such as would be supplied by a contractor.

2433. Lord *Seymour.*] You have told the Committee that you believe that there may be a considerable saving in the stock, from the introduction of machinery; what is the price of a rough stock?—They vary considerably; I do not know the price that the Government last paid; the rough stocks are all supplied from the Government, I may say, I think universally; they generally range about half-a-crown in the rough state.

2434. In America, the Committee were informed they cost only 1 *s.* 2 *d.* in the rough state?—I am not aware of the price in America.

2435. According to the present mode of finishing, what would be the expenditure upon a stock before it was completed?—Does your Lordship mean on the present Government work?

2436. Yes?—I believe the expenditure on the woodwork would be about 11 *s.*; 10 *s.* or 11 *s.*

2437. For fowlingpieces the price would be still larger, would it not?—They all vary; they vary in the highest fowlingpieces up to I do not know what; a very large price.

2438. If they can be produced by machinery, it would be equally easy to produce them by machinery for the general trade as for the Government, would it not?—They could be done there is no question, if the private trade or any person invested money in the purchase of machines.

2439. Therefore, if it was an object to produce the stocks at a low rate, they could be manufactured for the private trade largely, by machinery, could they not?—Yes.

2440. The cost, of course, would depend upon the number produced?—Altogether.

2441. With regard to barrels, you have had a great deal of experience yourself in rifles, have you not?—A great deal.

2442. In rifling the barrels, is machinery largely employed?—It is largely employed at present.

2443. Should you expect any great improvement in the rifling of barrels?—Very great indeed; and to so great an extent do I go, that I do not believe it is necessary to cut any rifle barrel, I believe it can be done by an entirely different process; I believe that 1,000 barrels may be converted into rifles in the course of a day, without cutting at all, and without ever once having a cutting tool inside of them.

2444. Have you introduced machinery in the rifling of barrels yourself?—Extensively.

2445. Have you found it very advantageous?—Most advantageous.

2446. From that we may expect a decrease of price, may we not?—A very great decrease indeed.

2447. With regard to the lock, you have stated that one plate can be worked out, and that the cock and other parts can be worked out by cutters of various kinds,

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kinds, and by planes; do you introduce these yourself now?—In my own business I do not introduce the machinery in such perfection, because, as I have before explained, I do it entirely, except certain necessary machines that are indispensable in the construction of locks, by skilled labour.

2448. You have stated to the Committee, that by better machinery you may be able to attain such a result that a very slight amount of skilled labour will be necessary for finishing?—Very clearly so; all that I say is, enunciate a general principle more clearly; you adopt the principle, but you do not adopt it in its entirety.

2449. Can you state to the Committee whether that will lead to a reduction in the price of your guns?—I cannot say that it would; when you employ so largely skilled labour, you must always pay a high price.

2450. I thought that you proposed to substitute machinery for skilled labour?—Not in my instance.

2451. For your business you must retain the skilled labour?—Clearly so, because every gun differs in pattern.

2452. Supposing they were all one pattern?—Then I could reduce the price of it; if I could persuade every gentleman to shoot with the same kind of gun, then I would reduce the price.

2453. Mr. *Newdegate.*] You have not seen the application of the machinery which you now recommend to the making of bayonets, have you?—I have not seen it.

2454. Are you aware that there has been a difficulty in applying machinery to the production of the present pattern of bayonets, which is required by the Government?—I am not aware of the fact, because I cannot conceive the difficulty.

2455. Such a thing never came under your consideration?—No, certainly not. I cannot conceive why there should be a difficulty.

2456. Have you ever heard that others have attempted to apply machinery to the present pattern of the bayonet?—Yes.

2457. Do you conceive that they were so incompetent that they raised a difficulty where it did not exist?—I conceive that it is possible for a man to make a mistake.

2458. You are of opinion, are you, that the difficulty which has been found by the trade in Birmingham in adapting machinery to the present form of bayonet is entirely a mistake?—I consider that if they have not succeeded, the fault lies in the application of the principle, and not in the principle.

2459. You stated before, did you not, that the present form of bayonet would require more expensive machinery than another form that might be suggested?—I am not aware that that is my evidence.

2460. Is that your opinion?—I think that the present form of bayonet would require a peculiar adaptation of machinery; make it any form you please, and then imitate it by machinery.

2461. At the same expense could you make two different forms?—That answers itself; if you make one form much more intricate than another, to produce that form you must go to a greater expense.

2462. Then if the present form adopted by the Government is intricate, you must go to a considerable expense for machinery?—If you pronounce it intricate, or more intricate than another form that is more simple, it will involve a different application of machinery, and it might require one, two, or many more operations.

2463. Do you consider the present form which is adopted by the Government peculiarly favourable for the application of machinery?—I consider that there are no difficulties whatever in the form of the present bayonet to its manufacture by machinery.

2464. Do you think that it is the cheapest form that can be manufactured, or the cheapest with efficiency?—It is not a form that could be manufactured the cheapest, because you might devise other forms that could be manufactured more cheaply, but it is a perfectly efficient form, and can be manufactured by machinery.

2465. Could not other forms be found equally efficient and better adapted to machinery?—That I have not studied.

2466. You have stated that great improvements might be applied to barrel rolling, and to barrel boring?—Yes.

2467. Have

2467. Have you seen those improvements generally applied?—No, but I have seen an application of the principle to which I refer.

2468. You have not seen the application of machinery to that particular part of the manufacture?—I have seen drawings of the machinery that introduced the particular application to which I refer, not the machinery itself.

2469. With regard to the lock plates; you have stated that machinery might with great advantage be applied to them, and that such machinery would produce lock-plates exactly similar as they left the machine?—Yes.

2470. Are there not subsequent processes which might change their form?—The hardening would, as it undoubtedly does, frequently set the plate; and before the lock is put together and finished, it would have to be straightened.

2471. By what means?—By a skilful workman when putting the lock together.

2472. You have stated that you cannot give an estimate of the saving that would result from the application of the machinery that you recommend?—I cannot give a precise estimate.

2473. You stated that you saw no difficulty in making the mainspring by machinery?—None whatever.

2474. Do you think that that would lead to economy?—All machinery properly conducted must lead to economy.

2475. In general you do not believe in the principle, that any process can be more adapted for hand labour than for machinery?—As a general rule, I do not believe that.

2476. You apply your remark in this particular to the mainspring?—I would apply it to every part of the lock.

2477. You stated that you believed that barrels might be rifled without any cutting?—Yes.

2478. Have you seen that done?—I have not seen it thoroughly carried out; I know that a machine is now making to do it.

2479. That machinery is not now in operation?—No.

2480. Mr. *Muntz.*] You stated the other day that you had a great complaint to make with regard to the contract that you had for rifles?—Yes.

2481. What was the date at which you obtained that order?—The 29th of May 1851.

2482. What time did you give the order out?—On the evening of the same day, to Messrs. Lacy & Reynolds.

2483. What time did you give them to get it up in?—I told them my terms, and I asked them to assist me to the utmost of their power.

2484. What was the time in which you were to complete the order?—Under two months.

2485. Messrs. Lacy & Reynolds were to get up those guns?—They got them up.

2486. Do you know what time was given for that?—They stated that they could not accept any definite time for doing it, but they would use their utmost exertions to get it completed with all speed; they honourably fulfilled their promise.

2487. Will you look at that letter (*handing a letter to the Witness*), and say whether it corresponds with your view upon the subject?—The general terms of that letter are, that all speed shall be used.

2488. The general terms are, that seven weeks are to be allowed to get up the barrels in?—Yes.

2489. How were the guns to be finished if seven weeks were to be allowed for getting the barrels in; were you to get your guns viewed in the time that you engaged?—They could not be done in the time; they say that seven weeks are given to them to do it; now will the Honourable Member give me the reply to that letter?

2490. I have not seen it?—I have; and it is to the purport that they shall be done with all possible speed; and the work is to be divided among so many contractors, all those in Birmingham capable; and supposing it divided among all the workmen in a great town capable of doing it and receiving an equal quantity, and one is seven months about it, and another contrives to do it in three, could it be said that each had used equal exertion?

2491. You will probably recollect, that a complaint was made yesterday that those men having the contract could not get it done in reasonable time. If seven weeks were allowed for the barrels, how was it possible that the guns themselves could

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could be got up in the time that was given?—I received the order on the 29th of May.

2492. You see that that makes it at once two months?—Yes, I do not say that I expected to have it done in the time when I received the reply to it.

2493. You complained that it was not done in the time?—Neither was it; I say this, that it took seven months to do by some parties, and three by others.

2494. Colonel *Dunne.*] You have stated that you did not conceive that those barrels could be supplied in Birmingham in a shorter time than seven weeks, and you knew that there was a difficulty in doing it?—No, I am not aware that I used the term seven weeks; I think I must have referred to the operation in one case taking nearly seven months, and in the other three.

2495. As a matter of fact, you did not get them up under seven months?—The guns were not delivered till eight months after taking the contract, the whole of them.

2496. That being so, do you think it probable that a much larger contract could be executed in Birmingham within seven months?—No; within seven months, of the quality and pattern of 1853, I do not believe, if you had all the workmen in England, Ireland, Scotland and Wales, you could complete 27,000 in the first six months.

2497. Mr. *Muntz.*] What do you found your belief upon; did you ever have an order for 20,000?—From a somewhat intimate acquaintance with the nature of the trade, and the number of skilled workmen requisite to produce the quality required.

2498. Colonel *Dunne.*] Do you know what the number of skilled workmen are?—From the most careful enquiries, and great pains have been taken to ascertain, the number of workmen employed in the gun trade in England, Scotland, Ireland and Wales, do not reach 4,000.

2499. Mr. *Muntz.*] Does that include all sorts of workmen?—Yes.

2500. Can you give any authority for that statement?—I cannot give the Committee my authority for the whole of the inquiries, but I can give my authority for the number as estimated at Birmingham. There are under 2,000 for Birmingham.

2501. Mr. *Geach.*] When was that estimate made?—About eight months ago.

2502. Mr. *Muntz.*] Did that include the workmen in all the branches of the trade?—Yes.

2503. Mr. *Geach.*] All the men that were employed in that trade at that time?—Yes, as far as could be ascertained.

2504. Are you aware that a man who works at various parts of the gun trade is capable of working at many other trades?—I am aware of this, that if you desire to get together labour for the gun trade you may bring in a vast quantity of labour from other trades.

2505. Then your estimate was of those found employed in that trade at that particular time?—Yes, just so.

2506. Mr. *Muntz.*] And it included all the parties that worked at the different branches of the trade?—It estimated them all.

2507. What was your authority?—My authority for the number of men in Birmingham was a gentleman, late a partner in the firm of Hollis & Sheath in Birmingham, a Mr. Tranter, who is now in business for himself.

2508. Mr. *Geach.*] You have stated that you employ hand labour now to a very large extent; almost entirely?—Yes.

2509. Have you adapted any machinery at all to your own manufacture?—Yes, to the manufacture of barrels, to turning the outside and boring the inside, and putting them together by machinery, and rifling by machinery; in fact, to everything in which there was a sufficient quantity to pay for the cost of the machine.

2510. How many machines do you employ now in the manufacture?—Four.

2511. Have you any machines that are peculiar to yourself?—Yes.

2512. Did you invent them?—Yes.

2513. Did you find them to answer in the first instance perfectly?—Not perfectly. In several cases they required material alteration.

2514. Have you got them now to do the work that you wanted?—Perfectly.

2515. Did you ever fail in inventing a machine to do your work?—Never.

2516. Mr. *Newdegate.*] You stated that there was a machine in progress for rifling barrels to pattern; is that your own invention?—It is.

2517. It is not yet complete?—No.

2518. Mr. *Muntz.*] You do not make your own barrels, do you?—I do not forge them.

2519. Where do you get them from?—From Mr. Clive.

2520. Are they satisfactory?—Perfectly so.

2521. You stated that you thought much might be saved in an improved mode of rolling barrels?—Yes.

2522. Have you ever seen experiments made?—I have seen things produced from experiments; I have seen the drawings.

2523. A barrel?—Yes.

2524. Have you ever seen a barrel done?—I have seen a barrel that was done.

2525. Have you seen it when it was being done?—No, but I believe of the truth of those that told me.

2526. Your evidence is only secondary evidence?—I merely state my opinion, and what I have been told; I have been shown the means of doing it.

2527. Have you ever bored one of those gun barrels by keeping the barrel fixed and working inside?—Yes, I have.

2528. You stated just now that you would keep the barrel fixed?—On the contrary, I stated that I meant it to rotate at a great speed.

2529. Will it work more cheaply than by the present mode?—Yes.

2530. How many have you seen done?—Four.

2531. At what price were they to be made?—I have not entered into that.

2532. What sort of barrels were they; of what iron were they made?—Marshall's iron.

2533. Were they musket barrels?—No.

2534. What sized barrels were they?—A bore of 200.

2535. What length were they?—Two feet.

2536. You saw them done?—Yes.

2537. You cannot speak as to the price?—Not of the comparative cheapness.

2538. Can you form an idea of the price of one musket barrel?—If I could, I could form an idea of any quantity; I cannot, simply because I have not done one musket barrel.

2539. You stated that, in consequence of the improved plan of doing it, they may be done a great deal more cheaply; will you state how you arrived at that conclusion?—I have seen guns of greater calibre done, and I know the time that it would take to do guns of that calibre, to do them in the ordinary way, and I know that this does them quicker; I did the four that I did in quite a fifth less time than in the ordinary way.

2540. Do you mean rough boring?—Yes, and fine boring.

2541. Was the fine boring on the same principle?—Not precisely, but it was done by the barrel turning round.

2542. Did you form an estimate of the cheapness?—By making four barrels I know whether I do them quicker or slower, and if I do them quicker I save.

2543. You made an experiment quite satisfactory to your own mind?—Quite satisfactory.

2544. How much cheaper was it?—I think about a fifth would be saved in the time occupied in boring the barrel.

2545. What would it be in the barrel?—If you divide the time occupied in doing each barrel, and subtract one-fifth, that will give it precisely.

2546. Have you tried what it is?—Not on one.

2547. Did you try it on four?—I do not manufacture musket barrels myself, and I do not know precisely the cost of rough boring; I can get the information, if the Committee please; if you divide that price, and take a fifth from it, that will give the saving.

2548. Not having made barrels, and not knowing the cost of making them in the present way, how can you give the Committee a statement of the saving to be effected?—I know the time that it would take to do a certain operation; and if I use another means, and do it in a fifth less time, do not I convince myself that I do it in less time? I have seen the operation done.

2549. You were talking about making bayonets by Ryder's machine; have you seen it used for that purpose?—No.

2550. You stated that bayonets would be cheaper made in that way; how do you

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you know that?—Because you would more perfectly adapt the machinery for a given purpose; I dare say that other machines would do it.

2551. You have stated that after doing that, you would make the article quite good enough, and it would cost less when done?—I do not confine myself to the use of any particular machinery; I say it is possible to adapt machinery to the fabrication of a bayonet perfectly efficiently, and if you adapt machinery adequate to the purpose, you would effect a saving upon the hand labour.

2552. I want to know how you are able to tell the Committee that a bayonet will be made for so much?—I have seen estimates and sketches of what would be required; and although I said at the time that I could not give an exact estimate, I imagine that that would be the price.

2553. You have not seen the thing done?—No.

2554. You have taken the opinion of another person; has that person seen the thing done?—I do not know whether he has or not; all that I state is, that this principle is clear; if you find a machine at present that saves labour, and produces more, if you employ that machine to a fuller extent, you will effect a greater saving; all my evidence tends to that fact.

2555. How is the bayonet to be made for 2*s.* 6*d.*?—That is my impression.

2556. How do you arrive at that?—I cannot explain more than I have done; you will adapt machinery to the purpose, and what is done by hand labour now you would do by machinery.

2557. Suppose that a bayonet now costs 7*s.* 6*d.*, you state that by machinery that price will be reduced to 2*s.* 6*d.*; how do you arrive at that estimate?—By the perfect adaptation of machinery.

2558. Have you ever adapted it?—No.

2559. Have you ever known any one who has?—I have not known any one that has thoroughly adapted it yet.

2560. Then how do you arrive at your calculation?—I stated that I believed the price would be within such a mark; my opinion was, that it will be made at such a price, and I remain of that opinion still.

2561. It is merely an opinion?—I stated my opinion that a bayonet could be made at 2*s.* 6*d.*

2562. That opinion is not founded upon any practical knowledge?—I am not a bayonet maker.

2563. You were speaking about making locks, and you stated that when the parts were cut out by machinery that would reduce the price very materially; have you made any experiments yourself upon that part of the matter?—No.

2564. Do you know anybody who has?—I do not.

2565. Then you have an opinion that the thing may be done, but you have not done it, nor do you know anybody who has done it?—If it is admitted that machinery is of any use, it follows that, to apply it more thoroughly, the saving would be greater.

2566. Did you never know of an instance in which machinery was employed to too great an extent, and that the use of the machinery has been attended with great loss?—I have not; I have not heard of such a thing.

2567. With regard to boring the barrel, is the barrel that you spoke of bored out of a hollow barrel or out of a solid?—It may be done in either way, but by my plan it would be out of a rolled barrel, not rolled in the usual way; call it a tube.

2568. You would not propose to bore it out of a solid?—No.

2569. Is it your opinion that it would be any better if it was bored out of a solid?—It could be bored out of a solid with facility, it is true.

2570. Do you think that you could bore out of a solid a better or a sounder barrel?—I do not think it would be a bit better or sounder.

2571. It would not pay for the extra trouble?—If you have to make a hole through a thing it must involve a certain amount of trouble.

2572. Many persons think that a barrel bored out of a solid must necessarily have a sounder inside than one forged out of a rolled barrel; are you of that opinion?—I cannot see why it should be so; all the present musket barrels are rolled very nearly solid; there is a very little hole left in them.

2573. What is the size of the hole?—Before the boring commenced you could not insert your little finger.

2574. What sort of insides have they now?—They are perfect insides now they could not be better.

2575. You have stated that you obtained your knowledge with respect to the number of workmen fit to work from Mr. Tranter?—I did.

2576. Do you think that Mr. Tranter would give me this statement if I asked him?—I have not the least doubt that he would reply fairly to any inquiry that might be made of him.

2577. Are you still of opinion that if the locks were entirely finished, as you propose, by machinery, any important reduction of price would take place?—I think that there would be a reduction in price.

2578. You are supposing that they are all of one pattern?—Yes.

2579. You have no idea what proportionate reduction there would be?—It is impossible to say.

2580. Mr. *Newdegate.*] You stated, did you not, that the number of skilled labourers employed in the gun manufacture in the United Kingdom was 4,000?—Somewhere about that, as near as could be ascertained.

2581. Do you know that the production has been of late years about 300,000 arms a year?—I am not aware of the statistics of the number.

2582. Your calculation of the number of skilled artisans is independent of the known production?—Quite independent of it.

2583. You do not think it necessary to reconcile the two?—That has never entered into my calculations at all; it was not necessary, and I was not conversant with the way of obtaining a return of the number of arms.

2584. Are you aware that there are accounts from the different proof-houses?—Every barrel proved must be taken an account of.

2585. Would not that form the basis of the calculation as to the number of arms produced?—Yes, I have no doubt it would give you a very accurate return of the barrels produced; I did not take that trouble.

2586. Are you inclined to dispute the fact, that the number of arms produced in the last eight or 10 years has varied between 250,000 and 320,000 arms a year?—I am not at all aware of the number.

2587. Supposing that the number of arms which I have stated are produced is the correct number, is the production of that quantity of arms consistent with your statement that there are only 4,000 workmen to produce them?—It is quite a different question to enter into; I stated, as clearly as I could, the number of workmen, but in the exportation of any number of arms it is possible that a number of arms may have been in store, and some are re-purchased and re-furbished, and sent out, which is frequently done. The quality of the gun must be particularly specified in every case, to come to any conclusion upon the number. You do not know, in a number of arms exported, how many were guns that had been purchased at the Government stores, and exported in that state. I have never studied the question of the proportion of the number of arms exported and the number of men employed, to see the relation that the quantity of arms would bear to each individual, therefore I cannot answer the question.

2588. The question has nothing to do with the arms exported; the statement that I included in the question had reference to the arms produced in a year within the United Kingdom, and you were asked whether, supposing the quantity stated to be correct, the production of that quantity was consistent with the number of workmen that you have given?—I cannot give a decided answer as to what would be the amount of production by the number of men that I have stated.

2589. Mr. *Muntz.*] Do you know the number of men employed in London in the gun trade?—I have made inquiries of my friend Mr. Lacy, of the firm of Lacy and Reynolds, and he estimates the number as under 1,000.

2590. Mr. *Geach.*] You stated, did you not, to the Honourable Member for North Warwickshire, that although you had ascertained the number of men employed in the trade, you had not ascertained the quantity of work produced by those men?—I have not.

2591. But at the same time, in a former answer you stated that it was not possible with all the labour that could be procured in the gun trade to produce 25,000 arms in six months?—No, not of the pattern of 1853 in the first six months.

2592. Have you made any calculation as to the number of men that would be required to do that work?—I have made my calculations. I well considered how long it would take to get the manufacturers of materials thoroughly in

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motion, so as to keep up a constant supply, and from the number of men capable of working in England, you must subtract a certain proportion as incapable of doing that kind of work; another guide you have is this, you know the quantity produced, very nearly, of a similar pattern, for the Ordnance on different occasions.

2593. If large orders were issued for this pattern of 1853, would not there be a gradual increase of the skill required for that kind of work?—Most clearly so; if you give out a regular and constant succession of orders for large numbers for a series of years, there is no question that you may get together or aggregate a quantity of labour equal to that; there is not the least question that you may produce 200,000 a year if you give time to get together the labour.

2594. Have you considered what peculiar advantages the Government possess in adopting the manufacture of arms, or of anything else, as compared with private enterprise?—That is a question of imperial policy. My impression of an establishment, call it Government or otherwise, that would embrace the most perfect development of machinery, is this, that as compared with gathered together labour, it would have these advantages, it would have an establishment and machinery capable of producing any number you please to say; now, if you intermit the supply from the war demand to the peace demand, it is true your machinery will stand still, but you may suddenly increase that supply again to the war demand upon very short notice indeed. On the other hand, with aggregated labour, though you may procure gradually and educate by degrees any number of workmen you please, to produce any quantity that you want, still if you intermit the demand, and do not give those workmen sufficient work to proceed with, that labour will be dissipated to the four winds of heaven, and will employ itself wherever it can. These are the comparative advantages between a great establishment of machinery and one in which you aggregate labour to do the work for any given number.

2595. You heard the examination of Mr. Whitworth, did you not?—Not the whole of it.

2596. Do you agree with him, that even with the application of machinery, there must still, to produce such an arm as is required by the Government, be a great deal of skilled labour employed?—There must be a per-centage of skilled labour employed after it leaves the machine; there is no question about it, and that affords me an opportunity of stating that although, when the work leaves the machine, it will be inferior in finish to the arm as it now stands, yet if you apply, after it leaves the machine, the requisite hand labour, the finish will be equal to the arm as it at present stands.

2597. That skilled labour is necessary to the perfection of the gun, is it not?—Yes, to the finish of the gun.

2598. Does not that skilled labour bear a certain proportion to the machinery that would be employed in making those guns?—According to the perfection of the machinery, so will be the per-centage of the skilled labour.

2599. Whatever it is, it will bear a certain proportion, will it not?—It will bear a proportion relatively to the perfection of the machinery.

2600. Supposing this establishment, the advantage of which you state is, that it shall be fully employed in times of emergency and then discontinued, or only partially employed during the time when there was no great demand for arms, would not skilled labour have to be employed continuously, or would it not become dissipated in the same way in which you say the other labour would become dissipated?—You have to deal with such a small amount of skilled labour that you could keep what per-centage you pleased. By having only a small amount of skilled labour it is less troublesome to procure the necessary quantity than if you entirely depend upon skilled labour.

2601. Do not you find in the case of machinery itself, that if it is not kept constantly going it deteriorates?—It must deteriorate from use.

2602. Does it not deteriorate rather from want of use?—If it is carefully kept, and the parts carefully tallowed, I can conceive of nothing that would deteriorate it, except the rust, or any of those sort of things, that ought not to occur in a well regulated establishment.

2603. It would be an expense, would it not, to keep it up?—In all machinery there is a great expense necessary to keep it up.

2604. Then the cost of making those arms at the time when they are wanted must be added, and a large capital must be laid out for the purpose of being able to

to perform the work on an emergency?—I would have every expense added commercially in that way; the attendance, and everything of that kind, ought to be added to the estimate.

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2605. Do you believe that an establishment managed by those who have no interest in the pecuniary result would be so well managed as your establishment?—That is a question which I would rather not enter into; it does not enter into my evidence to state my opinion on those points, and I would not make any comparisons.

2606. Colonel *Boldero.*] You have made a statement which is rather alarming, coming from a person in your position; you declare that the United Kingdom could not in the course of 12 months produce 20,000 arms equal to the specimen in the room?—In six months. I repeat, that in the first six months I conscientiously believe that 25,000 guns of that quality could not be produced.

2607. Colonel *Dunne.*] Do you think that the intermittent demand which you must be fully aware the Government can only have for fire-arms, would induce the erection of machinery by private individuals?—If you give an order to one individual and say to him, "You shall have the whole of the contract for 10 years, and no other," I have no doubt that many people would erect machinery at a very large expense.

2608. Then it must be a monopoly?—Yes.

2609. And that monopoly must either be in the hands of the Government, or in the hands of a private individual?—Yes.

2610. Mr. *Newdegate.*] Do you know whether the officers of the Ordnance department have hitherto encouraged the application of machinery to the production of arms for the Government?—I am not at all acquainted with the internal arrangements of the Government departments.

2611. Are you acquainted with the transactions between the officers of the Government and the arms trade of Birmingham, during the last 10 years?—Not at all; not officially I mean.

2612. Have you had any experience of contracts for the Ordnance except that contract for 350 double carbines?—Not for guns entirely.

2613. What other contracts have you undertaken?—The rifling of some arms for an experiment.

2614. To about what extent?—Quite a limited number; under 150 altogether.

2615. The statement which you have made with reference to what has occurred between the Ordnance officers and the arms trade of Birmingham, and the statements you have made with reference to the capability of the arms trade to supply the Government, are not based upon any experience of your own?—I am not aware I have made any statements, and certainly not upon experience of my own in the manufacture of military arms.

2616. Mr. *Muntz.*] You stated just now that there were only 1,000 skilled gunmakers in London?—That is the statement as I received it.

2617. Do you know what number of guns were made in the 10 years, from 1841 to 1850?—I do not recollect the number.

2618. Supposing it to have been 60,000 a year, what should you think of that?—That has not entered into my calculations at all.

2619. The real statement is this; from 1841 to 1850 the total of the guns manufactured for the Government and for the East India Company was 584,376, or an average of 58,437 for each year, and you are probably aware that the quality of the guns was the same as that of the rifle guns?—I do not consider that the quality is equal to that gun (*pointing to the same*).

2620. What is the difference?—I consider this by far, in all its qualifications, the best military arm that I have ever seen, and the work on this gun is better than that in any other arms that have ever been produced for the Government.

2621. Do not you think that the new percussion musket up to 1850 would require as good a workman to do it as the other?—Certainly not; the work is better on this arm than on the percussion musket.

2622. Supposing, in round numbers, that those 1,000 men produced 60,000 guns a year, the 4,000 men of whom you spoke would produce 240,000, would they not?—Pardon me; I stated that I received that estimate of the number of workmen at present in London. I spoke of the present number.

2623. Mr. *Monsell.*] Do not the materials for making those arms come from Birmingham?—Yes.

2624. Are you aware whether the statement that has been made of the number

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of arms supplied in 10 years to the Government and the East India Company includes all sorts of arms, inferior as well as superior?—The arms for the East India Company, I believe, are of the recognised pattern of the arms for the Government; they are always of the recognised pattern. I do not conceive that any arm delivered would be inferior to that; and assuming the data to be correct, I should think that the arms would have been fully equal, or they would not have been received.

2625. Do not the Ordnance contract for the sea service muskets?—Yes; and they are of a vastly inferior character.

Mr. *Richard Prosser*, called in; and Examined.

Mr. *R. Prosser.*

2626. *Chairman.*] WHAT is your profession?—A civil engineer, in Birmingham.

2627. Are you acquainted with machinery?—I am.

2628. What kind of machinery?—That class of machinery which is used in the hardware trades.

2629. Working in iron and wood?—Yes.

2630. Have you written a work on the construction and manufacture of fire-arms?—I have not; I am writing one now. Her Majesty's Commissioners of Patents are publishing specifications relating to fire-arms; those that are patented in this country.

2631. Will those specifications be contained in an appendix to your work?—The specifications are before the Committee, and the appendix will be in addition. These are the specifications of arms published under the new Act of 1852.

2632. Are you the patentee of any machinery?—Yes.

2633. Of what kind?—Of machinery for making nails, buttons, and tubes.

2634. For what purposes?—Steam boilers and rocket tubes, iron-welded tubes.

2635. Have you supplied large quantities of such tubes to America and to France?—I have.

2636. Are your tubes for tubular boilers in general use?—They are.

2637. Have you supplied the United States with tubes?—Yes.

2638. For what purposes?—Rocket tubes.

2639. Are you acquainted with Osborne's patent of 1817 for making barrels?—I am acquainted with all the patents that have ever been taken out in this or any other country for that purpose.

2640. Have any improvements been made in the manufacture of gun barrels since that period?—Not that I am aware of.

2641. Is Osborne's process still in general use?—It is.

2642. Are you acquainted with the gun trade?—I know it generally, not specifically.

2643. Do you know it sufficiently to be able to give an opinion as to the introduction of machinery into the trade?—I think that I am competent to do so.

2644. Will you state your opinion to the Committee on that subject?—I think that machinery may be largely introduced in the manufacture of guns, but instead of employing the word "machinery," as I never expect to see a gun made by machinery, I should prefer to use Mr. Whitworth's expression, "labour-saving machines."

2645. Will you explain the distinction?—I have made machines to make nails. When you put a strap upon the machine, and the iron to it, it goes on making nails till all the iron is used up. That I call a machine; but I never expect to see lumps of wood put into one end of a machine, and bar-iron at the other, and come out a musket.

2646. In your opinion, could labour-saving machinery be introduced to any considerable extent in gun making?—Very largely. In 1811, James & Jones, of Birmingham, took out a patent for improvements in fire-arms. That machinery was offered to the English Government, and refused; and a friend of mine, who is dead now, or I would have produced him, recommended James & Jones to the Russian Government, and the Russian Government took up this invention, and they established at Toola a manufactory for manufacturing arms, of which these are the plates, and the description. There are 42 plates (*producing the same*). I do not think that there is any part of the gun except the stock, but what is in some way operated upon by means of labour-saving machines, or tools; and the result of that machinery is this, that about 1822 Mr. Fairy,

Fairy, engineer, of London, went to Russia, and at Toola he saw this machinery in operation. It was some time about 1817 that it went out, and he saw there 12 Russian soldiers come with muskets made by this machinery; there weze 12 baskets before them, into which they put the stocks, locks, and barrels, and everything else, and then fell into rank again. Each man then went to the basket and took up a stock, a barrel, and everything, and put them together, and fired them off in two minutes.

2647. Were they made by this machinery?—Yes, by the machinery of which that is a description. The work is in Russ, and it is now being translated.

2648. Are you aware whether that machinery is still in use in Russia?—I believe it is; I heard to-day that there is an Englishman there managing it now.

2649. Could similar machinery be introduced into this country for making muskets with advantage?—I think that that machinery is too complicated, and not sufficiently up to the knowledge of the day.

2650. Mr. *Dundas.*] Do you know who made this machinery?—It was made at Toola, in Russia; the Russian Government have always had emissaries over here buying tools, and taking the best of everything. I had Dr. Hamel with me eight years ago.

2651. *Chairman.*] If the introduction of machinery would facilitate the making of guns, why should not private gunmakers have introduced it?—There is not the slightest inducement for them to spend a penny in machinery; I would not do it.

2652. Why not?—Because there is no certainty that they would have Government work to make that machinery remunerative.

2653. If a manufacturer had a contract for a long time, do you think that machinery could be introduced with advantage by private gunmakers?—No question about it; if you gave them 500,000 to make a year, there would be no difficulty in finding money to erect machinery.

2654. If you had that number of guns to make a year, would you introduce machinery?—I could not make them without. I have a man in my employment, to whom, I pay 35*s.* a week, and he has been offered 3*l.* to go into the gun trade; but he will not go.

2655. Why not?—He is a beautiful workman, and says that the gun trade is so uncertain, that he prefers staying with me. This is the handle of an American axe (*exhibiting the same*), turned in America by machinery; I have had it for many years; but I never could find anybody to believe my statement.

2656. For what reason?—Because they do not know how it was done.

2657. Is the machinery that is used in America superior to ours?—We have nothing of the sort in this country; that is turned in a similar machine to what is used in turning gun stocks; I have been familiar with that machinery for many years, it was patented in 1820 by Blanchard, and the patent renewed in 1834, because it had not paid.

2658. Is similar machinery employed in America for gun stocks?—It is similar machinery.

2659. Are you acquainted with Colonel Colt's manufactory?—I have not seen it; I know his pistol, and I have one here.

2660. You have never seen his manufactory?—I have not.

2661. Are you acquainted with the Minié rifle?—Yes.

2662. What is your opinion of it?—I think it is a first-rate piece of workmanship; I have never seen work better done; it is an Enfield gun, but this has come from the Tower in Birmingham.

2663. Mr. *Newdegate.*] Is there any difference between that and those guns which are completed in Birmingham?—There is no difference in point of workmanship.

2664. *Chairman.*] Is the lock a good lock?—A very good lock; I do not think that there are 20 men in Birmingham who could file that lock (*pointing to the same*) so as to pass this view, and get a living, at 5*s.* each lock.

2665. Do you think that you could produce as good an arm by machinery?—You may employ a good deal to save labour, and reduce the expense; for instance, the filing of this plate is a very heavy and laborious job out of the rough.

2666. Mr. *Dundas.*] Is the cock made by machinery?—It is stamped between dies; that is a swivel lock (*exhibiting the same*), and this is the old hook lock (*exhibiting the same.*) The swivel lock has been introduced lately with the army guns.

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2667. Lord *Seymour.*] You supply the tubes for rockets, do you not?—Yes, to the United States.

2668. Do you supply any tubes for rockets to the Ordnance here?—No.

2669. Are the tubes used by the Ordnance of the same kind as the tubes that you supply?—The tubes that I have seen used by the Ordnance are very clumsy things; they are brazed.

2670. At what rate do you supply the tubes to the United States Arsenal?—I have not supplied many rocket tubes; I have sent tubes to the United States.

2671. Have you supplied any other Government?—Yes, the French Government.

2672. Then the French and American Governments have the advantage of your superior tubes, while the English Government are still using their clumsily contrived ones made by themselves?—The French Government gave an order for my tubes in Birmingham, and inspected the process, to see that they were all right; and now they are made in France by my process.

2673. They paid you for the patent, did they not?—Nothing; people never think of paying inventors; I supplied them to the Government; they were prohibited tubes, but as they were for the Government steamers, they got over that; I supplied the Government engineer, the late Mr. Barnes.

2674. Have you ever offered to supply the Government here?—No, I am not a tube-maker; it is my patent, and the Patent Tube Company at Birmingham are working it, and supply the Government.

2675. What is your own business?—I am a civil engineer.

2676. You have been chiefly concerned in the invention of machinery, and the application of it, have you not?—Yes, and the bringing it out.

2677. That has made you acquainted with all the different patents which have been taken out for barrel-making?—Yes, that, and having the advantage of being at law for some years to defend my patent.

2678. Has there been any improvement in barrel-making within your experience?—Not since 1817; not the slightest, except my own patent, 1840.

2679. Not in machinery or anything else?—Not the slightest, that I am aware of, except my own.

2680. You have stated, that you do not think that any private gunmaker has any inducement to use machinery to any great extent?—Not the slightest, unless he had a large contract for arms.

2681. Is there any private trade in America using machinery?—Not that I am aware of; I do not know of it.

2682. If there is no inducement in this country, from which there is a considerable export trade in arms, there would be less in America, where there is not even that export trade in arms?—I apprehend that the private trade in America is very small in arms.

2683. Then they would have less inducement to use machinery than we have?—Certainly; with the Americans it is a scattered trade; ours is more concentrated.

2684. Therefore, again, ours being more concentrated, there would be more facility for using machinery than where, as in America, it is scattered throughout the country?—Yes.

2685. You have referred to the machinery that was invented by James and Jones in 1811; are you aware whether anything was made with that machinery in this country before it went to Russia?—I know that it succeeded very well, and it is in use now. About 14 years ago, the Ordnance introduced a regulation that all gun barrels should be turned; but James & Jones proposed that in in 1811, and it got to the Ordnance Department about 14 or 15 years ago.

2686. Did the Ordnance reject the invention?—They could see no merit in the machine.

2687. You are not acquainted more than very generally with the gun trade, are you?—No, generally; as a matter of workmanship, it is a matter of interest to me.

2688. Mr. *Newdegate.*] If I correctly understood, you stated that there had been no improvement in barrel making since 1817?—I am not aware of any, except my own patent of 1840.

2689. Did you not state, that subsequently the process of turning barrels had been adopted, and within a few years?—It was invented in 1811 by James and Jones.

2690. It has been adopted since 1817?—My remark applied to welding the gun barrel, not to the turning of it; the barrel used to be ground before on the outside, and James and Jones proposed to supersede the grinding, which was a dangerous operation, by a lathe, which is now in use.

2691. Then the Committee are to understand, that the application of the lathe to the production of gun barrels has been subsequent to 1817?—It was proposed in 1811 by James and Jones, and is now used by the Russian Government at Toola.

2692. But the application of it in our country has been since 1817?—I am told that it was about 13 or 14 years ago.

2693. That is an exception to your original statement?—No, I spoke of welding the gun barrel; there has been no improvement in that since 1817.

2694. You stated that some person in 1822 saw 12 Russian soldiers bring the parts of several muskets in a basket from a manufactory, and put the muskets together, and then fire them off?—Yes, in two minutes.

2695. Do you know whether those parts had been previously fitted?—They had been made at Toola.

2696. Do you know whether those parts had been previously fitted after leaving the machinery?—I apprehend they must have been; there can be no doubt in the mind of any practical man that it must have been so.

2697. Do you think that the machinery adopted in Russia is too complicated?—Yes, and such as should not be employed now. Our machinery has very much improved in the last 20 years.

2698. Is there, or was there ever the same amount of skilled labour applied to the production of arms in Russia that there is in England?—I do not know the labour that they employ in Russia. I know that they have machinery which we have not, because these are the drawings. The literature of invention is at a very low ebb in this country. Absence of knowledge on such points should not be considered a qualification for employment in mechanical affairs.

2699. You stated that there was not sufficient inducement on the part of the private trade to introduce machinery?—I do not think there is any under the present system.

2700. Do you think that in the production of from 250,000 to 300,000 stand of arms in a year there is not a sufficient inducement to adopt the best machinery?—Not an inducement for any manufacturer to spend money, unless he has previously the assurance that he will have a contract for a time, and at a price, and with a proper view. You cannot make a musket like that (*pointing to the same*) by machinery without highly skilled hand labour.

2701. Do you consider that the present view is such as to have necessarily increased the difficulty of production within the last few years?—I consider the severity of the view so great, that I do not believe there are 20 men in Birmingham who could file the lock to pass the present severe view.

2702. Are the Committee to understand positively that there are not 20 men who could produce it?—That is my opinion, and I have made inquiry.

2703. You are not in the gun trade, are you?—No, and therefore I have no bias.

2704. Your opinion is, that the absolute severity of the view, taking into account the price, is such as to render the production of that arm extremely difficult in Birmingham?—I do not see how a man gets a living by that lock (*pointing to the same*).

2705. Are you aware that the view has been much more stringent within the last three years?—No. In consequence of writing an Appendix on Fire-arms I waited upon the Ordnance, who gave me permission to visit the Tower. I am accidentally here, and I had not been in the Tower for many years before a week or two ago.

2706. You are not aware of any change in the system of view which has taken place within the last few years?—No, I am not; but I have seen things refused which makes me know that the view is more severe than I consider it ought to be, or for safety it should be.

2707. Are you of opinion that sometimes things are refused by the viewer, when it is doubtful whether they ought to be refused or not?—I do not know; but I should say that the severity of the view leads to that, of necessity.

2708. And that would be a great impediment to production, would it not?—Very great.

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2709. Are you aware of the fact that hitherto this country has been more fortunately situated for the production of arms than any country in the world?—That is my opinion.

2710. Is it not your opinion that if such resources were properly used, the means of producing arms which has hitherto existed ought to continue in this country?—I think that our means of producing Government arms in this country have been very small indeed; but, under a proper system, I think they are unlimited.

2711. Are you aware that this country has supplied many other nations with arms?—Yes, I am. I know a merchant in Birmingham who supplied 35,000 in about three months; this is the tool (*exhibiting the same*), and I think the price is 10*s.* 8*d.*

2712. Are you aware that there are firms in Birmingham who have the largest export trade of first-class guns of any firms in the United Kingdom?—Yes; and I know that there are firms in Birmingham who sell those pistols. A merchant lent me this (*pointing to a pistol*), and I consider that his clerk, Mr. Johnson, knows as much about a gun as any man in Europe.

2713. Are you aware of the fact that there are firms in Birmingham who have the largest export trade in first-class arms of any firms in the United Kingdom?—I should think so.

2714. Are you aware of the fact that there is a greater variety of quality, and a greater quantity of arms exported from Birmingham than from any other town in the world?—Yes, I should say that it is so.

2715. Does not that prove that in Birmingham there exists great resources for the production of arms?—It proves that there are a large number employed, but not that they have the means of producing arms rapidly.

2716. Does a large annual production prove a power of rapid production or not?—It does prove a power of production by hand labour.

2717. Such as they are, a large quantity has been produced?—No doubt of it; but at a great expense.

2718. What you anticipate, then, from the application of machinery, is a reduction in the cost?—Yes.

2719. You stated that the uncertainty of the demand for the Government was such, that a workman in your employ would not go into the arms trade?—No; I think that does operate.

2720. Are you aware of the fact that within the last two years the demand for the Government has been unnaturally restricted?—I know that, generally.

2721. Then when this man of yours refused to go into the arms trade, it was the period immediately subsequent to the unnatural restriction of the demand on the part of the Government?—Yes.

2722. Mr. *Geach.*] You stated, with regard to the lock, that the workmanship was required to be such, that very few men could do it; you do not mean to say that a superior lock for a gun would be produced by machinery?—No, I do not think it can be produced by machinery at all; parts can, to a very considerable extent.

2723. Supposing those parts to be made by hand and by machinery, you can obtain the same accuracy by hand as you can by machinery, can you not?—Yes.

2724. It is merely a question of expense?—Machinery enables one to get over the work quicker, and it saves the labour.

2725. You have stated that you do not see any encouragement held out to the gun trade to erect machinery?—No; I cannot see the slightest.

2726. Why is there not as much inducement to erect machinery in that trade, seeing that there is a large general demand for guns, as there would be in any other trade?—If any man erected machinery for making guns, and then went to the Ordnance and said he was ready, they might alter the pattern, and then what would be the use of his machinery.

2727. They might alter the pattern if they had their own machinery, might they not?—Yes; but in the case of a contractor, his machinery would be thrown out of commission.

2728. If the Government altered the pattern when it was generally made by machinery, that would, of course, increase the expense, would it not?—Yes; and the gentlemen who have talked of making arms by machinery are aware of the weak places. Colonel Colt and Mr. Anderson do not like turning sharp corners by machinery; they want the thing rounded off, and made nice and easy, and then it becomes an easier thing to be done by hand.

2729. Mr. *Muntz.*] You were aware, were you, that the gun was to be suited to the machinery, and not the machinery to the gun?—That is the tendency of all those who have spoken upon the subject, and I think it should be so.

2730. You are aware that if such alterations were made in the pattern which is now used, a great reduction would take place in the price?—It would.

2731. You were speaking of Osborne's patent just now; the date which you gave was the date of its first introduction, was it not?—Yes.

2732. Are you aware how long it was before it came into general use?—A good many years; I cannot tell how long.

2733. Did he ever realise 6 *d.* by it?—I do not think he did; he was driven into it by strikes.

2734. You also spoke about the lathe invented by James and Jones?—Yes.

2735. Are you aware that those lathes were all worked at my manufactory for some years?—I have heard so.

2736. Did you ever hear that the Emperor of Russia came there to see them?—To see some, I know he did.

2737. Are you aware that when those lathes were sold, a portion of them were bought by the trade?—No, I am not.

2738. Did you ever hear how many were sold to the Emperor?—No.

2739. Did you ever know how many were worked at my manufactory?—I did not.

2740. You do not know that such lathes are now in use?—There are a variety of lathes in Birmingham, and I say that the lathe now used is similar to that which James and Jones used; I did not know that the same identical lathe was in use now.

2741. Have you seen a barrel turned by it?—Yes; by a similar sort of lathe.

2742. You have seen barrels ground in the old way?—Yes.

2743. Some parties are in the habit of grinding the surface after they are turned?—Yes.

2744. What they call wiping it over the stone?—Yes.

2745. You would prefer, would you not, that they should be finished off at the lathe?—You could not finish them off at the lathe; the finish depends entirely upon degree.

2746. I mean finished so far as regards the barrel?—I think it should be finished in the lathe, and then finished by hand, with that degree of surface that you require.

2747. Have you ever taken any notice of the exterior of the barrel; that is required according to the pattern, with regard to its straightness?—No; I have not done that, because I have fancied sometimes that they are curved; I thought it was a mere matter of caprice; James and Jones say that the barrel is to be turned according to the pattern.

2748. You say that this barrel must be draw-filed afterwards, before it is finished?—Yes.

2749. Is that requisite?—Yes; to get that surface.

2750. It would not be possible to finish it from the lathe, so as not to want any draw-filing?—No; not to give that surface; the marks are the long way of the barrel.

2751. Did you ever notice the present mode of boring a gun-barrel?—Yes.

2752. Did you ever see any experiments made with the view of boring them upon a better principle?—No.

2753. Are you of opinion that if, instead of the barrel being fixed and the tool revolving, the barrel was made to revolve and the tool fixed, that would economise the boring?—I think that the present plan of boring the barrel is the most bungling process that is carried on in mechanics; the barrel ought to revolve.

2754. Do you think that by adopting the plan that is recommended, of making the barrel turn round, and the tool being fixed instead of working the square bit, it might be done better and cheaper than now?—I do.

2755. Did you ever see it tried?—I bored a cylinder last week in that way, four inches diameter.

2756. Would it be more difficult to bore a barrel?—You must exercise care in both instances; you must have care; I wanted this cylinder for a metallic piston to work in.

2757. What was the substance of the piston?—It was about four inches in diameter.

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2758. But compare that with the substance of a rifle?—Then you must use less pressure.

2759. Would it not be a tedious and expensive process?—No. This cylinder began at six o'clock in the morning and was finished at eight at night.

2760. How long was it?—Five feet, perhaps.

2761-2. You never saw a barrel attempted to be bored in that way?—No.

2763. Are you aware that it has been attempted?—I do not know that it has for a gun barrel. I should imagine that the American rifle, turned out of solid steel, must be so done.

2764. Do you mean in rifles?—Yes, Whisson's rifle.

2765. Why do you say so?—There is no other way of boring a cylinder that I know of, to get the hole straight.

2766. Have you ever examined the inside of one of those barrels?—Yes, I have.

2767. How far do they vary from a cylinder?—I should think there is a variation of the $\frac{1}{400}$th of an inch in those that I have tried.

2768. Did you ever try them with plugs, so minutely fitted as to answer to the $\frac{1}{1000}$th of an inch?—I have tried them with plugs, but when you come to the $\frac{1}{1000}$th of an inch, I cannot see it. This is one of Mr. Whitworth's gauges (*exhibiting the same*). In the tubes that I sent to America, considerable loss was suffered by the tubes being made in England, and the holes in the boilers being bored in America. As I have a set of Mr. Whitworth's gauges, we know what an inch is. Those gauges are very accurately made, and I sent a set of gauges to the United States and I kept my own, and we have never had the slightest difficulty since then.

2769. What variation, in trying one of those Minié rifles with the proper plug, did you find in the interior of the rifle?—The $\frac{1}{400}$th of an inch between the different parts of it.

2770. Did you try it by a series of plugs?—By plugs.

2771. Is it not a matter of hearing too?—The $\frac{1}{1000}$th of an inch is so delicate, that you can only feel it.

2772. Did you find the $\frac{1}{400}$th part of an inch difference between the breech and the nose?—That was the greatest difference between all the different parts of the barrel. The American Board of Ordnance allow a variation of ·015 inches in the diameter of barrels of small arms ·69 inches diameter.

2773. Suppose that you bored a gun on the principle that I have just spoken of, namely, the barrel revolving and the cutter fixed, would you get nearer to perfection?—Yes.

2774. Or so near?—I do not know how near.

2775. Then you do not think there would be any advantage in that?—It would be straight, but there would be the irregularities of the cut in it.

2776. You are aware that the straightness of the barrel is determined by the sight of it?—Yes.

2777. Did you ever practise that sufficiently to be able to perform that operation?—Sufficiently, I think, so that in a very short time I could get as expert at it as any man of ordinary practice.

2778. Did you ever see any other plan succeed but the sighting?—No.

2779. With respect to locks, you said just now that you did not think a lock could be made completely by machinery; have you seen locks made in the neighbourhood of Birmingham?—I have not seen them manufactured of late years. I know the tools that they use.

2780. Are you of opinion that any great saving may be effected in the construction of a lock by applying machinery to it?—Yes, 50 per cent. in labour.

2781. Will the lock be finished when that is done?—No; it must be hand-finished.

2782. Have you any idea of what reduction in the cost of a lock there would be by applying more machinery to it?—I look upon this lock (*pointing to the same*) as a piece of workmanship to be worth 5 *s.* or 6 *s.* to file.

2783. Supposing it to be sold for 7 *s.* 6 *d.* finished, viewed, and accepted, what reduction could be made by using increased machinery in the manufacture of the lock?—If it costs now 7 *s.* 6 *d.*, I am satisfied that it could be made for 3 *s.*

2784. Not in a finished state?—Yes.

2785. Could you finish a lock by machinery without any hand labour?—No, except that I am sure that so much machinery could be employed as to enable a person to finish this lock for 3 *s.*

2786. Are

2786. Are you aware of the extent to which machinery is applied now?—I am not aware of anything but the ordinary grinder being used, and I think they have put a steam strap to it.

2787. Suppose one of those locks to be made by machinery, could you insure those locks all fitting in the way you spoke of?—I do not know what degree of hand labour had been employed to make the locks do that.

2788. It has been stated that a lock may be made solely by machinery so perfectly that when a cart load of them are mixed together they will all fit without hand labour?—I do not believe that; it is contrary to all my experience. I have made thousands of hardened steel tubes, and never in my life could I get a plug to fit a hole, or a punch to go into a hole without grinding; and in that the $\frac{1}{1000}$th of an inch would be fatal to the workmanship.

2789. Did you ever see Colonel Colt's manufactory?—No.

2790. You do not know the machinery that he uses for making those locks?—I think it is very much like the Russian plan.

2791. You have never seen two locks taken to pieces, and the parts fitted indiscriminately into one another?—Yes.

2792. What locks were they?—These two do (*pointing to the same*).

2793. What are those?—I had these from the Tower in Birmingham.

2794. Those are hand-made locks, are they not?—Yes.

2795. Are you sure that the parts of those locks fit one another?—I had these locks from the Tower, and I asked a man to take them to pieces, and I put one upon one piece of paper, and the other upon another sheet of paper, and I changed the plate and the rollers, and I said, "Now put them together." He said, "They will not;" but I said, "I want you to put them together," and he did it. And I said, "Now view those locks;" and he passed them, and they are now in the state in which he put them together.

2796. The parts of one being fitted into the parts of the other?—Yes.

2797. How did they get the parts exactly to fit?—By gauges.

2798. They jigged them, did they not?—Yes.

2799. Are you of opinion that, so far as the correctness of the work is concerned, a lock made by the jig is quite as correct as a lock made by machinery?—I do not see how there can be any difference.

2800. Those locks fit, do they not?—They do.

2801. You are confident that they were changed?—I took these locks off the workbench, and told the man to take them apart, and he put one on one sheet of paper and the other upon another, and I changed the plates and the tumblers myself.

2802. Was the man surprised at it?—Yes.

2803. He never tried it before, perhaps?—I should say not.

2804. You have practised in steel work and the hardening of steel; are you of opinion that, in any cases where steel of various forms has to be hardened, you can ever be certain of all the parts of locks fitting, after they are hardened, without altering?—They never can. I have sunk medal dies, and hardened them, and hardened the collar in which the dies fit, and I never could get a collar but what went oval in the hardening, and required to be corrected by hand labour.

2805. The more irregular the form, the more difficult it is to keep it in form?—Yes.

2806. Speaking of the additional machinery requisite to make locks, would it be very expensive for a lockmaker to obtain the machinery requisite for making locks?—I do not think that machinery for making locks would be very expensive.

2807. Have you any idea of the expense?—It might cost 1,000 *l.*

2808. Merely to make one lock?—No, the lock machinery.

2809. I mean such machines as are requisite for perfecting the lock; what would the expense of that be?—About 1,000*l.*

2810. How many machines do you contemplate?—Probably a dozen.

2811. You do not know how many are used at present?—No.

2812. You think that 1,000 *l.* would make the thing perfect?—Yes.

2813. It does not seem to be quite out of the reach of individuals to have such machines as that?—No; and I think they would have them if they had any assurance that they could have the work regularly.

2814. Do you happen to know a man of the name of Minton, in the Potteries?—Yes; Mr. Minton is working my patent for buttons.

 2815. I believe

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2815. I believe he is a potter, and he makes tiles and bricks?—Yes.

2816. Has he got machinery for making tiles?—He has a great many.

2817. When Mr. Nasmyth was examined, he stated that he had been making a machine for Mr. Minton?—He has a patent for a machine with Mr. Minton, jointly.

2818. Has he ever made a machine for Mr. Minton?—There is one at Stoke now.

2819. How long is it since he made it?—It is a patented machine, on the 26th of April 1851.

2820. Was that the first that he made?—The first, and the only one.

2821. Has it ever made any tiles?—It has; I had a letter from Mr. Minton this morning; I am often applied to for machinery for making bricks, and I wrote to Mr. Minton to know how they were getting on; and he says "Mr. Nasmyth's machine has worked well for a short time, but each time it has broken; we are now strengthening some of the parts, and hope soon to have it at work again."

2822. How long has it been put up?—Between three and four years.

2823. And it has not got to work yet?—In a new machine there is generally a screw loose.

2824. Have you ever seen it?—Yes.

2825. What is the matter with it?—I told Mr. Minton, when I saw the specification, it never would make a brick.

2826. But it has done so?—No; I distinguish between making and manufacturing, in a manufacturing sense.

2827. It has not turned out well, has it?—I should say not.

2828. Is Mr. Minton satisfied with it?—He is a very liberal man, and he does not grumble at a little expense.

2829. Is he connected with Mr. Nasmyth in the machine?—Yes.

2830. Who is the inventor?—They are joint inventors.

2831. Then Mr. Minton cannot complain of Mr. Nasmyth, because it would seem that they are both in fault?—Yes.

2832. You know a great deal about Birmingham and the neighbourhood, and something about London and the neighbourhood; taking into consideration the locality, the circumstances of the two places, the rates of wages in the two places, and various other advantages and disadvantages, can you form any idea as to the cost at which a Birmingham man can manufacture muskets, as compared with a London man?—The wages would be higher here, and coals would be higher, and rates and taxes; and when you are carrying all those materials, I suppose the finished article is less than about one-third of the gross weight.

2833. Can you form any idea, having had much experience, of how much cheaper a Birmingham man can manufacture arms than a London man?—I should think at least 10 per cent.

2834. Have you ever been at the Government manufactory at Enfield?—No.

2835. You do not know whether they have been making any experiments as to machinery there?—No.

2835*. Supposing they have a manufactory now competent to produce a certain portion of arms, what is your opinion with regard to their adding to their means there, instead of having a new establishment?—I think that the Government have gone in such a higgledy-piggledy way about their mechanical operations that they get the worst of everything; they go and visit, and see machines, and then take them away in their head, and then put them to work.

2836. Have you ever heard of their sending down to Birmingham to get plans of other persons' machines?—Yes, I have heard of that.

2837. Did they ever come into contact with you?—I did see Mr. Lovell some years ago; he wanted some tubes rolled for sword scabbards.

2838. Did you ever hear of the Government sending down two men to Mr. Rivers, the cap manufacturer, to learn how he made caps?—No.

2839. What plan should you recommend to the Government now?—I think the Government ought to spend a sum of money in machinery, for making arms.

2840. To what extent?—I think to the extent of 25,000*l.* or 50,000*l.*; they ought to have two manufactories, one wherever they please, and one in Birmingham, and keep books by double entry, and have a public accountant, and I think the Birmingham people would very soon show them what o'clock it was.

2841. Do you think that the manufacture in London would compete with the manufacture in Birmingham?—Where a man is his own judge, jury, and executioner, he has a light sentence. The London works would be in that position.

2842. What portion of the manufacture should you recommend to be done by the Government, with a view of securing themselves against the consequence of misunderstandings between the manufacturers and workmen?—I think that they ought not to touch the barrel at all.

2843. Do you think that they ought to touch the lock?—I think they are better without it; they should do the stock, and the setting up, I think.

2844. You think that they ought to put up machinery for stocking barrels, in addition to their present means?—All machinery that, on consulting intelligent men, they might consider would be beneficial in the gun trade.

2845. If, when they had set up that machinery, they found that they could not compete with private manufacturers, should they let it stand still?—They ought to do. I consider when Brigadier-general Bentham brought out his machinery, it effected a great national saving. The savings in copper, in one year, were 40,954*l.* 12*s.* 8*d.* when the copper mills were erected. The expense of reconverting copper into sheathing by the Government was $1\frac{1}{2}$*d.* per pound, and Greenfield and Williams charged them $4\frac{1}{2}$*d.* They had an inquiry before The House, and they then offered to do for $2\frac{1}{2}$*d.* what they had previously charged $4\frac{1}{2}$*d.* for. I think that was a great saving in one year, but I think there is a time when the Government should cease to manufacture also.

2846. You do not know that at this time they cannot make copper at all, and they cannot keep it on the bottoms of the ships?—They should use Muntz's metal, and they have got as far as that. I was at Woolwich a few days ago, and they had got as far as that metal in some screws, about as big as your finger; it is a mixture of 60 parts of copper and 40 of zinc, and it has the property of not corroding like copper, and it is much cheaper and better.

2847. Colonel *Dunne.*] You stated, did you not, that it was a Mr. Osborne who invented some machinery?—Yes.

2848. You state that he did not gain by it?—I do not think he did.

2849. You stated, did you not, that he was forced to use it from a combination among the workmen?—Yes, that introduced the machinery; skelps used to be forged by hand, and Mr. Bradley introduced machinery for that.

2850. Do you think that combinations still exist at Birmingham?—Yes; if there is a bit of an order, the master and men cannot go on at all in the gun trade for Government.

2851. That increases the difficulty of obtaining those orders, does it not?—Yes.

2852. Is not that pressure greater the greater the want of arms?—No doubt of it.

2853. Mr. *Muntz.*] That is why you recommend that the Government should have an establishment of their own to keep them in check?—Yes; apart from the application of machinery, the Government have never given the engineers of this country any chance to do what they can do. At the Great Exhibition the place was filled with inventions; for instance, American reaping machines. I said, "That is an old invention." I thought the Yankees were going to eat me, and they got a council medal for it. We have published the specifications on reaping in this Appendix, and it proves now to be an English invention brought back from America, and put up here as an American invention, and they are constantly doing that; whereas all the improvements in the working of wood that I have ever seen are due entirely to General Bentham's patent of 1791 and 1793.

2854. Mr. *Muntz.*] Are those what the Americans now are adopting?—Yes, they have patented them over and over again. General Bentham introduced Mr. Brunel to the Government, and Mr. Brunel has in all the printed books the credit of it, but it does not belong to him. This is Mr. Brunel's specification (*producing the same*); he was employed under General Bentham to carry out this notion, which was patented in 1801; General Bentham's was in 1793. This specification of Mr. Brunel's is contained in General Bentham's, but Mr. Brunel received 16,621*l.* 8*s.* 10*d.* for his remuneration, being the savings in one year by making blocks by the Government machinery, instead of buying them from the contractors.

2855. That is, Mr. Brunel applied the principles of General Bentham to making blocks?—Yes, he took out this patent, but he was under General Bentham.

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2856. There has been much money saved by making those blocks. Supposing that machinery had been in the hands of individuals, do you not consider that there would have been as much saving?—Yes, but I cannot see the inducement in gun-making for any individual to spend money; he has no security as to time and price; I would not engage in it.

2857. Do the Government generally spend money to more advantage than individuals?—I think, in the instance of General Bentham, if the Government had continued it, we should have very largely benefited.

2858. Are you aware that the Government had an arm manufactory at Lewisham?—I have heard so.

2859. And that they proposed to spend 16,000*l.*, and they spent 66,000*l.*, and then abandoned it. Suppose the Government act upon the same principle now, and spend 150,000*l.*, do you think that they will confine themselves to that amount?—It is not usual in estimates for machinery. I recollect ordering a lathe from Mr. Whitworth, and I was to have it in six weeks, but it was 12. Every mechanical week is a fortnight. I think you should have double the money, and then you would get about right.

2860. If every mechanical week is a fortnight with regard to Mr. Whitworth, is there not the same allowance to be made for the unfortunate gunmakers who set out to make the guns that are now made, for the delay that takes place?—Yes, I think so. The above was an exception to Mr. Whitworth's usual practice.

2861. Should not an allowance be made for the Minié rifle work?—Yes; I consider the bayonet very difficult to make.

2862. It has been stated that bayonets could be made for 2*s.* 6*d.* apiece; what is your opinion upon that?—The bayonet on that stool (*pointing to the same*) is only 1*s.* 3*d.*

2863. But not such as that; it is to be a better one, made by Ryder's machine?—Ryder's hammer is a first-rate tool, and I think it is applicable to any drawing out process.

2864. What do you think of the price of that bayonet; would you like to make it for 2*s.* 6*d.*?—That depends upon the quantity.

2865. And subject to the view?—I would not have the view at all; no shading.

2866. Have you ever examined the shank of it?—Yes.

2867. The least variance in form and size is an objection to the bayonet?—This looks as if it were made of iron and steel.

2868. The Ordnance insist upon having them precisely as they are, or else they are not received?—That bayonet cannot be made by any man in England for 2*s.* 6*d.*

2869. Can it be made for 4*s.*?—This is a most difficult thing to make; it is three-cornered; I can see exactly where it hurts; it is taper, and there is a constant change of curvature.

2870. You never saw machinery for the express purpose of making them?—No.

2871. It is to be done, it is said, and it will be a very simple machine?—If a man has a machine, I think it is worth 2,000*l.* if it will do that.

2872. Did you ever see a machine that could do it?—I cannot conceive of it; I would not do it, nor think of it; I could make that bayonet by tools, but not by machinery.

2873. Can you make a machine to make anything?—You may go too far.

2874. Have you seen it carried so far as to become a burden?—Yes; I remember in regard to some machinery that must have cost, I think, 10,000*l.* or 12,000*l.*; I recommended it to be divided; I said, "You will then make some money by it." That hurt their pride, and so their pocket suffered, and they never made a halfpenny; but other persons in Birmingham use that machinery; it is used very extensively now in divisions, and has been very profitable; it is a button-making machine.

2875. Colonel *Boldero.*] Did you hear the evidence of Mr. Lancaster?—Yes.

2876. With your knowledge of the trade of gunmaking, do you agree with him that the gunmakers, if they combined together to make the Government 25,000 muskets, such as you have before you, could not accomplish the work in six months?—I do not believe a word of it; I am sure I could accomplish 25,000 in six months.

2877. Mr. *Geach.*] Will you state whether your experience has not shown that the progress of the application of machinery to supersede hand labour has been

been a very slow one, and been the work of a great number of individuals?—Yes, and a work of time.

2878. Although you may imagine that a machine will do a certain work, it is a long time before you will get it to what you have properly described, namely, to manufacture the article it may make?—Yes.

2879. There is a distinction between making and manufacturing?—Yes, that was first defined by Mr. Babbage.

2880. It is stated that there is a large amount of hand labour now employed in making guns; would you have confidence in the success of any one individual who proposed to apply machinery to all those parts to which machinery had not been applied before, and erected a large manufactory, expending 150,000 *l.* upon it, expecting that at the end of 12 months he would manufacture perfectly 100 guns a day, and 12 months afterwards 500 guns a day; would you believe that such an expenditure of capital as that would be successful to the extent stated?—I do not think it is possible.

2881. You know very well that these things can only be brought about by slow degrees and time?—Yes; if Mr. Whitworth were to assure me that he had considered the subject of manufacturing arms, and told me what he thought he could do, I should believe him.

2882. The cut-nail trade has arrived at a very great state of proficiency; as you say, the iron is put in, and without any attendance it comes out nails, but that was arrived at very slowly; there were very many improvements?—Very slowly.

2883. You were not the only person who made improvements in that trade?—No.

2884. There were a great number of manufacturers, and many minds were brought to operate upon the same thing?—Yes, I do not know a more difficult thing than the thing that has not yet been accomplished, namely, the manufacture of wrought-iron nails by machinery.

2885. Wrought-iron nails have not yet been manufactured by machinery?—Yes, I mean that; they have not superseded the hand nail, and they would not pass the Ordnance view.

2886. Mr. *Muntz.*] You have been in the habit of erecting and making a good deal of machinery, and you can give the Committee a correct opinion as to the probable results of any outlay upon machinery; Her Majesty's Government contemplate laying out 150,000 *l.* to make guns by machinery, say within 12 months from the commencement, though they have not yet got a machine made, and in 18 months from the time of the commencement they are to make 500 guns a week; do you believe, knowing what you do about machinery, that the manufactory will be completed in 12 months, or that they will produce a gun in 18 months?—If you were to lock me up, with a good salary, I would not engage to give an opinion upon such a manufactory under 12 months; I must have all the drawings and specifications before me.

2887. Mr. *Dundas.*] You stated that you thought any private firm could make blocks more cheaply than the Government?—I think they could now.

2888. Then there is an imperfection in the machinery?—It is in a transition state; we are going constantly on improving; it was beautiful at the time it was introduced.

2889. At the time that it was invented of course it could make blocks cheaper than anything else?—It was made by the great Mr. Maudslay, under the directions of General Bentham.

2890. That has nothing to do with its being in the hands of the Government?—If a private manufacturer used that machinery now it would ruin him; great improvements have been made in machinery since that was erected.

2891. Mr. *Muntz.*] Mr. Maudslay, you say, made the machinery, but Mr. Brunel applied it?—Mr. Maudslay schemed it, and made it under the direction of General Bentham.

2892. What did Mr. Brunel do?—He drew the feather "over" the eye of the Government, and he got 16,621 *l.* 8*s.* 10*d.*, to which he was not entitled.

2893. What did the machinery cost?—I do not know; this is Mr. Brunel's specification, and if you take this specification to Portsmouth you cannot find machinery like it.

2894. It has been altered since?—It never was like it; it was schemed by Mr. Maudslay, and General Bentham, and Mr. Brunel, who was very clever at gimcrackery.

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gimcrackery. Mr. Maudslay was a great mechanic, and so was General Bentham.

2895. They did it between them?—Yes.

2896. Her Majesty's Government did not do much towards it, except paying for it?—Nothing else; General Bentham spent out of his own property 20,000 *l.* in making machines according to this specification; I asked Mr. Anderson if he had read this specification, and he said that he had not; I also asked those in Woolwich Dock-yard last week, and they had not; so that there they are working General Bentham's machinery, and nobody knows his name.

2897. Did you go into the carriage department?—Yes.

2898. Did you see the machinery for rolling scrap iron?—Yes.

2899. Did you see the way in which it was put down?—No.

2900. Did you see that they were working, instead of at the centre, all on the one side?—Yes.

2901. Did you ask who had done that work?—No, I did not.

Mercurii, 22° die Martii, 1854.

MEMBERS PRESENT.

Sir W. Molesworth.	Lord Seymour.
Mr. G. Dundas.	Mr. Monsell.
Mr. Muntz.	Mr. Walpole.
Colonel Lindsay.	Colonel Dunne.
Mr. Newdegate.	Mr. Geach.
Colonel Boldero.	Lord Paget.

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Richard Webb Gunner, Esq., called in; and Examined.

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2902. *Chairman.*] WHAT office do you hold?—I am inspector of small arms.

2903. How long have you held that office?— One month.

2904. Mr. *Muntz.*] Prior to that time you were viewer at Enfield, were you not?—I was storekeeper there.

2905. You superintended the work, did you not?—I was the superintendent of the royal manufactory, and also the storekeeper.

2906. You did not view the guns made at Enfield?—No.

2907. Did your son do so?—No; there are viewers there for the purpose.

2908. Since then you have been appointed inspector at Birmingham?—Yes; and inspector of small arms generally.

2909. At Enfield as well as at Birmingham?—Yes.

2910. When you first went to Birmingham as inspector, did you find any written instructions which had been given by the previous inspector to the viewers?—There were written ones.

2911. Have they been since withdrawn?—I have withdrawn them with the view of looking them over, but I have not had time to do it.

2912. Have you any of them with you?—No.

2913. What was your object in withdrawing those instructions?—To see what the instructions were, and to see whether they required any alteration.

2914. Since they have been withdrawn, the men have been viewing without instructions, have they not?—For a short time, under my general directions.

2915. Do you find that under your general instructions the viewers take sufficient care, and only reject such articles as ought to be rejected?—Up to this time I find it so.

2916. Is the quality of the materials received equal to what they were under the late instructions?—I believe so; I have heard nothing to the contrary at present.

2917. Lord *Seymour.*] Were the instructions to the viewers withdrawn?—For the present; not entirely.

2918. As I understand, when you went down to Birmingham you withdrew the instructions to the viewers; is that so?—Yes.

2919. Did

2919. Did you withdraw those instructions because you did not approve of them?—No, for the purpose of seeing what those instructions were.

2920. You relieved the viewers from any instructions during the time that you were looking at them?—I have not had time yet to look them over; I withdrew them for the purpose of seeing what the instructions were.

2921. Could not you see what they were without withdrawing them?—Not very well; I wished to take them in the office and consider them over.

2922. Those instructions had been acted upon for some time, had they not?—I believe so.

2923. You intended that they should not be acted upon any more till you had reviewed them?—I gave no contrary orders to the viewers; but the thing being anomalous (we had no such instructions for the viewers at Enfield), I thought it my duty to investigate those instructions.

2924. Mr. *Walpole.*] While you were investigating them they would not be acted upon?—I believe, virtually, they are. I have not had an opportunity of looking at them.

2925. Colonel *Lindsay.*] Under what instructions are they now viewing?—My general instructions to view and to test the gauges, proofs, and all other things, as is usual in the case of viewing.

2926. *Chairman.*] Did you suspend the instructions?—Merely so.

2927. Lord *Seymour.*] Were those instructions very voluminous, as you have not had time to look them over?—Yes, very; they vary according to the nature of the work that is to be viewed.

2928. Mr. *Muntz.*] Those instructions were given by your predecessor, were they not?—Yes.

2929. How long is it since they were withdrawn?—About a fortnight, when I first joined the duties.

2930. A month ago?—I cannot confine myself to the day.

2931. Had you reason to believe, from anything that you had heard, that those instructions were more severe than necessary?—Not at all.

2932. But you must have had some reason for withdrawing the instructions?—It was merely to look them over, and to see of what they consisted.

2933. You do not consider it necessary now that they should have written instructions?—I do not know that.

2934. In the month since they have been withdrawn, have you found any inconvenience in the view from the want of written instructions?—Not at present.

2935. Do you think that the articles are in every respect carefully observed and viewed?—I have reason to believe so.

2936. Have you any reason to believe that in consequence of your withdrawing those instructions the view has been less vexatious, and the materials received better?—No, I have no reason to believe so.

2937. Is it not the fact that the materials have been received in a much larger proportion, and that there have been less rejections?—We may attribute that to the workmen having become better acquainted with the nature of the work than at first; there is generally a little difficulty at the beginning.

2938. You do not know, from your own knowledge, that there was any vexatious view before?—I do not know that.

2939. You have only heard that?—There are reports that are vague; I do not always credit them.

2940. Did you ever hear of any articles being rejected at Birmingham that were afterwards sent to Enfield, and received as good and finished articles?—None occur to my recollection.

2941. Had you not some sights at Enfield that had been viewed at Birmingham and rejected?—I do not recollect that; not to my knowledge; I have no recollection of any transaction of that sort.

2942. Could you ascertain that?—I do not know that I have any means of ascertaining it; if there had been any written correspondence on the matter I should have remembered it.

2943. Do you know a contractor for sights of the name of Aston?—Yes.

2944. Have you no recollection of sights of his being refused acceptance (I do not mean since you have been at Birmingham, but before) by the then viewer at Birmingham, those identical sights being afterwards sent to Enfield, and

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approved of as being good and sufficient articles?—I have no recollection of anything of the kind.

2945. Have you never said that you believed articles had been rejected that ought to have been received?—I do not recollect saying so.

2946. May you have said so?—It is possible that I may, in the hurry of the moment; sometimes a viewer may overlook a thing.

2947. What is your opinion with respect to the quality of work that you receive now in Birmingham in the Minié rifle; are you satisfied with it; is it good and serviceable in every respect?—All the work that passes the view I am perfectly satisfied is of good quality, and fit for the service.

2948. Such as you can recommend the Government to use with confidence?—As good as can be made by military hands.

2949. Did you ever see any of Colonel Colt's pistols?—I have, but I know but very little about them.

2950. What is your opinion as to the quality of the work?—The barrel is very good, and the cylinder is very good.

2951. Looking at them as a judge, as you are, do you consider that the work in Colonel Colt's pistols is equal to the work in the Minié rifle?—No, I do not; certainly not.

2952. Is the finish as good?—Certainly not.

2953. Are the parts as well fitted together?—Certainly not.

2954. What should you think if there were similar work in the Minié rifle as regards the durability of the arm?—The internal work would all be rejected; the fittings and the springs, and the internal work.

2955. They are not fitted in such a way as that you could pass them with confidence as being a durable and useful article?—Certainly not, those that I have seen; I have seen very few.

2956. How many have you seen?—Not a dozen, I do not think.

2957. Suppose you have seen a dozen; did you notice whether there was any material difference in them?—I examined the bores with a plug, and I found them very correct, the barrels well made and rifled; when I speak of the work, I mean the internal work, the springs and the lock part.

2958. If such work as that which is now turned out by Colonel Colt were submitted to you in a rifle, you would have rejected it?—The parts that I have referred to.

2959. Colonel *Dunne*.] You say they would be rejected; do you mean that the rifles made at Birmingham, or those made at Enfield, are superior?—The rifles made by contract are superior so far as regards the locks, as compared with Colonel Colt's.

2960. Is it your opinion that any part of the present view could be dispensed with, with safety to the Government?—Certainly not.

2961. Do you think now that there could be obtained, by contract, within six months, any large quantity, say 25,000 muskets, in Birmingham?—I cannot speak of my own knowledge there, but from reports that I have heard, I should say that you might get them.

2962. Do you think that the pattern rifle which was sent down, and which was made at Enfield, the ·577 bore, is well made?—Yes.

2963. Is that the one that is now the pattern for which a contract has been entered into?—We have two patterns; there is the artillery carbine, and the musket of ·577 bore.

2964. I speak of the musket which is called the Enfield musket; is not that the one for which there is a contract out, the ·577 bore?—Yes.

2965. Then there was a contract for a certain number of artillery carbines?—Yes; that was before I was appointed inspector.

2966. Mr. *Newdegate*.] Do you believe that the work of machinery can be brought to such perfection, that if a large number of muskets are made by it the different parts of the muskets can be immediately fitted together promiscuously, without the intervention of hand labour, further than in the screwing?—I do not feel myself competent to give an opinion upon that subject. The plan of the Master-general and the Board has not been submitted to me; my predecessor might have given an opinion, but he is ill.

2967. You have not seen enough of Colonel Colt's pistols to be able to give an opinion in that respect, so far as they are concerned?—No, I did not see Colonel Colt's machinery.

2968. Have

2968. Have you seen a number of his pistols, and compared their parts?—No; very few.

2969. You stated that you thought the present system of view indispensable for securing the goodness of the work?—Yes.

2970. Do you think the present system of dividing the contracts, that is, of dealing with many different contractors for the different parts of the musket, essential or contributory to the expeditious and satisfactory supply of arms to the Ordnance?—Yes, I think it satisfactory to the supply of arms, certainly.

2971. Do you think that it extends to an expeditious supply?—I can hardly answer that question; certainly we have a better opportunity of judging of the various parts; I should say that they get the materials of the musket at a cheaper rate by going to contractors who make each article separately.

2972. You think that you get the musket cheaper by that process than if you contracted for the whole arm?—Certainly.

2973. Have you had much experience in Government contracts?—Yes, I have had some experience in Government contracts, having been 40 years connected with the small arms manufacture.

2974. When was the system of contracting for the different parts adopted?—As long back as I can remember; I never knew any other system of obtaining military arms than by going to various manufacturers for the articles that they produced; for the barrel to the one who made it, for the lock to the maker of the lock, and so on, with all the other component parts of the musket.

2975. Are you aware whether the same system is adopted by the East India Company?—I believe it to be so.

2976. Is that the system which is adopted by the trade when required to supply foreign Governments?—That I am not aware of. I am unacquainted with their method of going to work for their supplies.

2977. Colonel *Lindsay.*] You stated that the internal work of Colonel Colt's arms would be rejected; will you state to the Committee, as generally as you can, your reasons for that opinion?—The work is inferior, and it is made by inferior workmen.

2978. Have you ever seen it?—Yes, I have seen two or three of them, and those two or three that I saw were inferior to our manufacture; take, for instance, the lock on the ·577 bore; that is very superior to the work in the interior of Colonel Colt's pistols.

2979. Do you speak as to the fitting, the hardening, or the tempering?—The whole; not the barrel and not the cylinder; they are well made.

2980. But the lock?—Yes, the general finish; and the letting into the wood is careless and unsightly.

2981. To what do you attribute that?—To the want of skill in the artisan who makes them; it is a lower class of man.

2982. Do you attribute that to the parts being made by machinery solely?—No, I have no opinion to give upon that subject. I believe that a great deal is made by hand labour.

2983. Lord *Seymour.*] You state that you do not attribute the inferiority of the parts you have named to machinery?—No.

2984. If any part is made by machinery, is it the fault of the machinery that it is inferior or not?—I believe that those parts to which I have been referring are not made by machinery; the springs, and the pins, and such like, the screwing and the tapping.

2985. Will you enumerate the parts of it that are not made by machinery?—I think the springs are not.

2986. What springs do you refer to; the main spring?—Yes, the main spring and the scear spring; perhaps it may be partly made by machinery, but not having seen it, I cannot tell whether it has been made by machinery.

2987. But you can detail what are the parts that are inferior?—The main spring, and the springs generally are.

2988. Colonel *Lindsay.*] There are two, are there not?—Two or three.

2989. There is the scear spring and the main spring?—Yes; the cock and the tumbler are all in one, and that is inferior; and the bents are very inferiorly cut; and the little part where it catches on the scear, the scear nose, did not fit; they are very weak there.

2990. Lord *Seymour.*] Without reference to whether they are made by hand

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or machinery, you consider those parts inferior?—I do; I cannot say what parts are made by machinery.

2991. If such a lock were brought to you, whether made by hand or by machinery, you, as inspector, would consider it your duty to reject it?—Yes, under my present instructions.

2992. Colonel *Lindsay.*] As regards machinery, you have not studied its applicability to the manufacture of locks?—No.

2993. *Chairman.*] Is the internal work of Colonel Colt's revolver so inferior as to impair the efficiency of the arm?—In some degree I should say it is.

2994. Mr. *Monsell.*] Is there the same strength required in a pistol as in a gun lock?—In our military work it is; there is very little difference in a pistol or a musket lock; the workmanship should be equal in strength.

2995. Colonel *Lindsay.*] You stated just now that the Government could not dispense with the system of view; supposing the Government contracted with one contractor for the supply of arms entire, would not that contractor be obliged to sub-contract for the other parts of the musket?—Yes, I should say so; one man is not the maker of the whole.

2996. You think that he would be compelled to do that?—Yes; to go to the barrel maker for the barrel, and the lock maker for the lock, and the bayonet maker for the bayonet.

2997. Mr. *Muntz.*] Would not that be a matter entirely in his own discretion? Suppose a manufacturer chose to lay out 30,000*l.* for a complete manufactory, what is there to prevent him doing so?—Nothing at all.

2998. Could not he make locks, barrels, and bayonets, and fit the muskets, if he chose?—I think that there is a better distribution of labour in the present system.

2999. If Mr. —— were suffered to get up the whole, is he not as competent to do so as the Government?—Yes.

3000. Colonel *Lindsay.*] Is he able from his establishment to do so?—I should say not at present.

3001. Mr. *Muntz.*] Because it is the present practice to separate and divide the different parts of the manufacture?—Just so.

3002. But it does not necessarily follow that that shall always be the practice of the trade?—No, but I have very seldom seen a good gun maker a good judge of a barrel, or a good judge of a lock; those men who give their particular attention to those parts are generally the most competent.

3003. Suppose it was considered to be a beneficial plan for the East India Company to order outright the finished gun, you might view the parts of that gun, to all intents and purposes, as well as you do now, might you not?—I think not.

3004. For what reason?—The man who furnished it, if there was a little defect in the barrel, would have an interest in hiding it, and he would not have that same interest if he did not provide the barrel himself.

3005. You think that the separate view of the barrel conduces to the perfection of the arm?—I think it does, in some degree.

3006. Supposing the Government manufactured arms themselves, you must have a separate viewer, as you have now, must you not?—Just so.

3007. Would no one then have an interest in concealing a fault?—The Government would employ such men as are competent to do their duties.

3008. You prefer the general system of obtaining materials first, and then putting them out to be finished and put up, as the best mode of doing the business?—I think so.

3009. Lord *Seymour.*] You have been inspector one month?—Yes.

3010. When you received the appointment of inspector, had you any written instructions given you, with regard to your duty as inspector?—Yes.

3011. Can you supply a copy of them?—I can.

3012. What are your duties?—To superintend the reception and inspection of small arms of all descriptions: muskets, rifles, carbines, pistols and swords, and all materials strictly relating to them, such as barrels, locks, rammers, and bayonets; and to see that all the viewers, and others in the department, do their duties, and carry out the Board's orders.

3013. Then the viewers are directly under your instructions, are they not?—Yes.

3014. How many viewers are there?—Fourteen, I believe, at Birmingham, and

and six or eight at Enfield; I do not know whether I am giving the correct number; I can supply it.

3015. Are the same instructions given to the viewers at Birmingham as to the viewers at Enfield?—No; there never have been any instructions given to the Enfield viewers, and that was the cause of my wishing to look at those at Birmingham.

3016. The Enfield viewers had no instructions at all; is that the case; is that the fact?—Acting merely under the superintendent, who was always on the spot, and the instructions of the inspector, they have never had any written instructions given to them.

3017. Mr. *Dundas.*] Have you seen the other revolving pistol, made by Deane & Adams?—I have.

3018. What is your opinion of the parts of that pistol?—The pistol that I saw of Deane & Adams was very good work.

3019. Would you pass the lock of such a pistol as that?—I should.

3020. Lord *Seymour.*] Respecting the viewers: if there is a dissatisfaction at Birmingham with the view, and the barrels or any other parts are rejected by the viewer, is that case brought specially under your notice?—Yes, now, in the case of a dispute between the contractor and the viewer, it is.

3021. If the viewer rejects, for instance, barrels or locks or any part, and the contractor wishes to appeal, he makes an appeal to the inspector; is that so?—It is so.

3022. Supposing the inspector agrees with the viewer, has the contractor any other appeal?—He can appeal to the Board.

3023. There is no resource but the Board?—No.

3024. There is no officer or committee appointed to whom an appeal can be made?—None but the Board.

3025. From whom do you get your barrels at Enfield?—We obtain them in a rolled state, by contract, from Birmingham.

3026. Do you see the iron first before it is made up?—No.

3027. You merely contract for the barrels?—Yes; but at the same time we stipulate that the iron is to be of the best quality, which we discover in the finishing, boring, turning, and filing of it; and if any blemishes occur in those processes, or if it fails in the proof, the contractors make all this good.

3028. With regard to the supply of the best barrel iron, are there many persons who supply it?—I know but of one, Mr. Marshall.

3029. In case the supply from Mr. Marshall should fail, what resource have you for obtaining that iron?—We must go to other iron manufacturers to get the next best.

3030. At present Mr. Marshall has almost the monopoly of the trade?—Mr. Marshall makes the best, certainly, and I believe most of the barrel makers have recourse to him for their iron.

3031. Is there ever any difficulty in getting the iron from Mr. Marshall, in the first instance?—None whatever.

3032. Have you had a difficulty in getting the barrels from the barrel manufacturers?—Occasionally; we have not so much now; I can hardly speak to what took place prior to my appointment.

3033. During the years that you were at Enfield, you obtained the barrels from those barrel makers?—We have not made a great many barrels at Enfield; 5,000 or 6,000 a year has been the most; we have converted a large store of old barrels, that were in store in former days, from flint to percussion.

3034. You have stated that you consider the system of dividing the contract, a better system than making a contract for the entire musket?—I do.

3035. Will you state why you think so?—In the first place, it seems to be an advantage to go to the manufacturer of an article direct, without going through a second person; there are barrel makers, lock makers, bayonet makers, and all those various tradesmen that we can go directly to with our money, the same as an individual himself would do; therefore it may be assumed that this individual would not give his time and attention without being paid for it.

3036. Have you any experience upon the subject; has the other system ever been tried?—Not in the Government departments.

3037. At Enfield, are the workmen that you have there kept continually on, or are they taken for a time and then parted with?—Generally speaking, they are kept on continually.

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3038. Have they any retiring allowance?—If they serve, and their conduct is good, at the end of a long period they get a retiring allowance; there are very few instances of that in my experience; most of them, what is termed, die in harness.

3039. They are employed continuously there for their whole lives, if they are found to be intelligent and good men?—Yes.

3040. Under that system you have never had any trouble with the workmen there; no strikes?—None whatever; I never remember a strike.

3041. Do you know what the wages there are compared with the wages given at Birmingham?—I believe, as nearly as possible, the general sum has been a little below.

3042. You think that the wages at Enfield for the different parts of the musket are a little below the wages given at Birmingham?—I am of opinion that it is so; I cannot answer that question very correctly.

3043. Mr. *Newdegate.*] A question was put to you with respect to the written instructions to the viewers; were there not some written instructions issued in 1851 to the viewers in Birmingham?—I do not know at what period they were issued.

3044. Have not the written instructions recently been cancelled?—No, none have been cancelled.

3045. Have they been altered?—Not a bit; I have not had time to look them over to see what they contain yet.

3046. You do not know whether they are the same as those previously to 1851 or not?—I do not; I have not had time to look into them.

3047. You spoke of the wages paid at Enfield, and you stated, did you not, that they were lower than those paid in Birmingham?—I believe that to be so; I cannot answer from my own knowledge.

3048. But the employment at Enfield is continuous, is it not?—Generally speaking, it is.

3049. It is a permanent staff kept by the Government?—Yes.

3050. Lord *Seymour.*] How many different views for the parts of a musket are there, eight or nine?—I dare say there are.

3051. Do you know how many there are?—Not exactly, without counting them up; the barrel is viewed generally first in the black state, then it is viewed in the fine state.

3052. There are only two views for the barrel?—No, only two.

3053. Now as to the lock; how many times is that viewed?—We take the lock from the forging, and then it is looked over, and in filing it is looked over; there is the jigging of the barrel, that is viewed; then the stocking and screwing together, and making off, that is viewed; then the smoothing and polishing the stock, and oiling it, that is viewed; then a view for the polishing of the brass, and a view for the hardening of the lock; and there is a view for the finished gun altogether, and the pull of the trigger; and if rifled, there is a view for the rifling; and if they are sighted with elevated sights, there is a view for that.

3054. On each of those occasions is the part to be viewed brought to the establishment of the Ordnance at Birmingham, or do the viewers go round to the manufacturers to view them?—They are brought to the Ordnance establishment at Birmingham.

3055. Therefore, if people are surprised by seeing parts of a gun carried about the streets under the present system of view, it is essential that the parts should be carried about the streets?—It is, unless it was all in one place together.

3056. Have you separate classes of viewers for locks, barrels, and stocks, or is one man considered competent to view the whole?—Yes; there is a viewer for the barrels, a viewer for the locks, a viewer for the stocking, a viewer for making off, and when the arm is short, one view for the making off, and then the finishing of the whole, and then a viewer for swords.

3057. Mr. *Dundas.*] Consequently very much time would be saved if the Government had a manufactory of its own, and a viewer in each department?—Certainly, a great deal of time must be saved.

3058. Mr. *Newdegate.*] You stated that there was a view for the sighting?—Yes.

3059. Are not marks placed upon the barrel previously to the fixing of the sights

sights by the direction of the officers of the Board of Ordnance?—I am unable to answer that question as to Birmingham. There have been none sighted since I have been inspector.

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3060. You have seen a great number of sights of the Minié rifle altered, have you not?—Yes, I have seen some altered.

3061. And the crookedness of those sights had not been discovered in time to prevent the imperfection which you had to correct at Enfield?—They are not corrected at Enfield; they are corrected at the Tower.

3062. It was not discovered in time to prevent the necessity of a great number being corrected at the Tower?—I cannot speak to that point.

3063. They were crooked when they came to the Tower, were they not?—I have not viewed them at the Tower; that has not been under my superintendence.

3064. Are you aware that they were corrected at the Tower?—I am not, personally.

3065. Have you never heard of the fact that a great number of rifles were crooked sighted?—I heard of it, but I have seen but few.

3066. But you have seen some?—Yes, some few.

3067. Mr. *Muntz.*] You stated, did you not, that you have been for one month inspector at Birmingham?—Yes.

3068. During the time that you have been there, you have had occasion, have you not, to visit several establishments for the manufacture of guns and parts of guns?—Yes.

3069. It has been stated to this Committee, that the manufacture of guns for the Ordnance in Birmingham is carried on in garrets and cellars; have you any knowledge of that sort?—I believe that a great many workmen do work in garrets.

3070. Those that work upon the Government arms?—Yes, I believe so.

3071. Did you ever see any workmen in garrets or cellars?—No; but it has been reported to me to be so.

3072. Did you ever see any men at work in cellars in your life in Birmingham?—No.

3073. You have heard so?—Yes.

3074. But you have not seen it?—I have not. The barrels are not made in garrets and cellars, certainly; there are good manufactories for them.

3075. What parts of a gun are made, do you think, in cellars, or what kind of work?—The screwing together, I think.

3076. Are the locks made in garrets and cellars?—They are made in very obscure places.

3077. Are they made in the town of Birmingham?—Very few; I believe they are made principally at Wednesbury. Mr. Brazier's is a very good manufactory at Wolverhampton.

3078. Have you been in his manufactory?—Yes, I have.

3079. Colonel *Boldero.*] Mr. Lovell, in a letter dated the 18th of March 1852, states, "that the Ordnance had paid 42 *l.* a ton for iron for rough rolled musket barrels, when the iron cost no more than 18 *l.* a ton; and this solely because the Ordnance department had not the means and machinery for making the barrels in the royal manufactory, where there is an abundant power of water unemployed;" is that so?—We have an abundance of water power unemployed at Enfield.

3080. Is it your opinion that the machinery that you want there for making the barrels, could be turned by that abundant water power which you have unemployed?—We have the machinery now, the barrel rolls, and abundant water power to turn it since that was written.

Captain Sir *Thomas Hastings,* R.N., C.B., called in, and further Examined.

3081. *Chairman.*] WHAT are the documents which you hold in your hand?—This return (*producing the same*) has been put in, and returned to me by the Honourable Member for North Warwickshire for correction, and to bring my own evidence in harmony with it. I am desirous of showing that it is so already without any correction, and I am also desirous to put in a paper which will make the other paper more clear to the Committee. I think the Honourable Member stated to me, that he considered that this return was at variance with the evidence

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which I had given touching the first order that was issued for the making of the Minié rifle in 1851; but this I think will show that he is in error. "Tenders for materials for setting up."

3082. Mr. *Walpole.*] What paper are you reading from?—This is my own memorandum: "Tenders for materials for setting up the new rifle musket pattern of 1851 were called for in May 1851, and the contracts for those materials were made in June 1851 (the 6th). Sufficient materials for commencing the setting up of the muskets were not obtained till December 1851. Tenders for setting up were then called for, and the contracts for setting up 23,000 rifle muskets, pattern of 1851, were entered into on the 4th of February 1852;" so that the original contract for materials was entered into in 1851, and the other contract was not entered into till 1852, which will reconcile the discrepancy between this return and the evidence that I gave before. This is "A return of the number of arms contracted for in each of the last 10 years, and of the number of arms accepted by the Ordnance in each of the last 10 years, from Birmingham and London respectively. Prepared in pursuance of the order of the Committee of the House of Commons, dated 10th March 1854. Small Arms Office, Birmingham, 13th March 1854." I think that that will reconcile the apparent discrepancy between my evidence and this return. I spoke of the dates at which the orders were given, and this return speaks of the period at which the contract with the setters-up was entered into. This paper (*producing the same*) will show the continuous return year by year as directed, and will also show the total number of arms taken in each year in London and Birmingham, showing that in the year 1844 there were accepted in London 5,601, in Birmingham 3,759; total 9,360. In 1845, (those are the line pattern, a superior arm), 10,674 were accepted in London, 4,109 in Birmingham; total 14,783. In 1846 there were accepted in London 6,446, in Birmingham 2,403; total 8,849. In 1847, in London 11,906 were accepted, in Birmingham 601; total 12,507. In 1848, 11,455 in London, and 3,575 in Birmingham; total 15,030. In 1849 there were accepted in London 11,458, in Birmingham 13,769; total 25,227. In 1850, 3,570 in London, and 2,431 in Birmingham; total 6001. In 1851, 242 were accepted in London, and none in Birmingham. In 1852, 108 in London, and 11,633 in Birmingham; total 11,741. In 1853 there were none accepted in London, and 11,846 in Birmingham; making a grand total of 115,586. If the Committee will let me explain, they will find this to be an abstract from the general return, and this shows the Committee the number of the first-class arms, which have been obtained in every year; the greatest number was in 1849, when 25,227 were obtained, and they vary from 9,000 to 15,000.

3083. Mr. *Monsell.*] Were the whole of the materials of that 25,000 obtained within that year?—No; the peculiar feature of this return is, that till we come down to the Minié rifles, a large portion of the materials were in store, and the causes for delay in construction which now exist, did not exist then. Having them in store, the majority of them were given out in regular succession, but since we commenced the Minié pattern we have been dependent upon the furnishers of materials, and we have been continually stopped in the progress of repairing the arms, because the materials were not furnished by the barrel makers and lock makers, and so forth. In one year the gross return here is about 49,000, I think somewhere about that, but the same remark applies. The year in which the greatest number of first-class arms was returned was in 1849–50, and in those cases the Ordnance had in store the barrels and locks, and a large portion of the materials, and the setters-up were not stopped by them. I stated to the Committee the other day, that I had not till the present year determined in my own mind that it would be wise to resort to any manufactory or machinery, and for many reasons. At the close of the year 1853, the rifles which had been ordered in 1852 were finally brought in, and as soon as they had completed the pattern determined on for 1853, orders were given on the 6th of October to set up 20,000 or 21,000, to make it even to all the setters-up and furnishers of materials; that was on the 6th of October. When I changed my opinion, it was about the beginning of January, and at that time, out of the 21,000 barrels, only 1846 had been returned; I then perceived that, in 3½ months, we could only obtain about 2,000 barrels, and the other materials also were in arrear. I felt it to be a great responsibility. I considered the case in all its bearings; and I saw, from this return, that the first-class arms were returned in a much smaller proportion than I had supposed. I observed that, when we had to rely solely on what

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what could be furnished by the furnishers of materials, that we were placed in a most uneasy predicament; and at this instant of time, looking at the case, we have, from the 6th of October to the present day, not obtained 6,000 barrels, and 6,000 other sets to commence setting up. That is the case as to the return; and I must again repeat to the Committee, that when those things were given out, not only did I verbally state that the Government would probably have a large demand for materials for small arms, but I said that whenever those orders were completed others would come forth; and to make it more clear and distinct, on each contract was written down at the conclusion, "Whenever these orders are completed other orders will be issued." Now, with that before me, I see that in six months we have not been able to get 6,000 stand of arms; and whatever may be the issue of this, as one of the officers of that department which is responsible to the country, I felt in making up my mind that I was only discharging my faithful duty to the Crown and the country in giving in my adhesion to a measure which would bring this question before the Government of the country, and lead them to take a decision on the question. I have nothing more to say, but that in changing my opinion, I did it on the most deliberate and extensive consideration of all the facts of the case; and whatever may be the issue now, I feel that I have done my duty, and nothing more, in bringing this forward, and making this statement to the Committee.

3084. Mr. *Newdegate.*] Will you allow me to look at the return which you have produced?—Yes. (*The same was handed to the Honourable Member.*)

3085. In this return, with respect to the number of arms contracted for and supplied during the last 10 years, there are two columns headed, "Contracted for" and "Accepted." The words "Contracted for" at the head of the first column refer to the contract for fitting up only, does it not?—Yes, I believe to the setting up only.

3086. Am I to understand that the first part, headed "Contracted for," refers to setting up only?—It would not bear that acceptation, because I perceive that the rifle pattern is dated 1851. That contract was entered into in May 1851, but then "Accepted" means, that those had been returned upon that contract which was made in 1851.

3087. The question I wish to put is with reference to the first column, headed "Contracted for"?—I see here (*pointing to the return*) that this is not exactly regular, for, according to that, if we take the contract for setting up, those ought to have been in that year only; but here it appears for the first time in 1851, and the same number is continued, if you observe, to 1853; that shows the contracts for the arms that were made. I do not say from that circumstance that it is perfectly correct, but it is substantially correct. This is the number contracted for, and there is the original date for the materials in 1851. Here are the numbers given in that year, the number contracted for, and the number supplied; so that perhaps it would have been better to have said the date of contract, and the date of delivery.

3088. Then I am to understand, that the first column represents the arms contracted for as being set up?—I do not say that decidedly, because, as I have just stated, it appears to me that in this instance the two things are blended together. One period was in May 1851, and the other in December 1851, and I think they are both included in that return.

3089. Could you furnish a correction of this return, so as to make it uniform?—I can send it back to Birmingham for correction.

3090. The second return is an abstract, is it not, from the other return, showing the number of first class arms supplied from 1844 to 1853?—Yes.

3091. That is exclusive of the extra service and the ordinary service?—All ordinary arms, sea service pistols, and, in some instances, colonial carbines and yeomanry carbines. I think the first class includes the line pattern musket, the rifle musket, the Minié rifle of 1853, the Victoria carbine, and the constabulary carbine.

3092. Is it the intention of the Ordnance to have only one class of arms for the future?—I should explain that the Board do not determine those things; we are only manufacturers, giving our advice as to the best way in which things are to be done; but for the army, in consultation with the Master-general of the Ordnance. The general commanding has a very great influence as to what the arms shall be. Again, in regard to arms for the navy, very properly we

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give our opinions, and those general opinions and principles are again modified by such special cases as pertain to the navy by the Admiralty.

3093. Might I ask whether it is the intention of the Ordnance department or of the authorities, so far as you know, for the future to order only one class of arm?—I stated before that the late Duke of Wellington and the Marquis of Anglesea determined that there should be a musket of one bore and one size, universally applicable to all branches of the service, whether it shall be a little shorter or a little longer, for the only essential is that it should be of the same bore; and I venture to express an opinion that there is no point of such extreme importance, either to naval or military operations, as that all the arms should be uniform in bore, so that with a slight modification for the ammunition in the field they may be always ready; for it is within my own knowledge, that when we sent out stores in the American war, all the shot for the 18-pounders were captured by a privateer, and there was the greatest possible inconvenience in consequence of that; whereas if the guns had been of one calibre, as they now are, little or no inconvenience would have been experienced. Again, in the field, if you furnish supplies which are to be at the right place, at the right time, it is clear, if you have seven or eight different calibres, you may find the wrong ammunition when people with different muskets come up to that point.

3094. The question is, whether it is the intention of the Government to issue for the future only one class of arms?—I conclude that it is the intention of the Government, because if you adopt the Minié rifle, or if you adopt any rifle, you require a barrel comparatively stronger than for a smooth bore, consequently that, which is one of the most important parts of the musket, of necessity must be of the same quality.

3095. Then, are the Committee to understand, that for the future nothing but the first class and quality will be admitted into any department of Her Majesty's service?—I cannot say that, generally I should assent to that, because the Admiralty might say at once, "We do not want so costly an arm as that which is given to the line; the coast-guard, for example, will require a shorter arm, and we do not think for that class of people it should be made up so perfectly as one that has to go through a course of campaigning."

3096. Mr. *Monsell.*] In the examination of Lord Raglan, the Master-general of the Ordnance, before this Committee, he was asked, "If you had one set of machinery making arms upon one pattern, it would then be possible, if desirable, to supply all the services with the same weapon, would it not?" His answer was, "Certainly." The next question was, "Is that your intention?" and his reply was, "Certainly, that is my view." Do you consider that Lord Raglan, as Master-general of the Ordnance, is a high and conclusive authority upon that subject?—Undoubtedly, the highest.

3097. Mr. *Muntz.*] When you state that there was a memorandum on the contracts given out, that future contracts would be entered into, will you state whether it was understood that each individual contractor was to expect that he was to have a subsequent contract when his contract was completed, or whether the old practice, requiring the whole of the contract to be completed, was to be adhered to?—I do not admit that it is the practice to wait till all the contracts are completed; I can speak distinctly as to the minute, because I caused it to be put there myself, and my intention was, that each individual should understand that the Government was urgently in want of the arms, and that the moment a man should have completed his contract, and was ready, the Government would enter into another contract with him.

3098. You visited Birmingham last autumn on this very subject, and you had communications with nearly all the contractors; did you, in your conversation with them, give them to understand that the old practice, requiring the completion of the contracts, would not be carried out as it had been, but that they should have a succession of orders?—I have no recollection of making a contract with them as to what had been done and what was to be done, but I distinctly endeavoured to impress upon their minds that arms were wanted, and that the moment the present contracts were completed, other tenders would be put out; that was my object.

3099. At that time your view was, was it not, decidedly that the best plan of obtaining arms, was the old plan, namely, of ordering them from Birmingham?—I have distinctly stated that my change of opinion was very recent, and that the failure in 1851 did not make me a convert to the necessity of changing the system.

system. My conversion to my present opinion is as recent as January last, when I found that the contractors had failed to fulfil their promises, and the Government were placed in the awkward position of wanting 200,000 stand of arms and could not get materials to set up 6,000 in six months.

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3100. Did you not at that time entertain the opinion that it would not be wise for the Government to have one arms manufactory, which might in case of invasion be obtained possession of by the enemy?—Yes; I stated that, I think, in a conversation which I had with the Honourable Member on that occasion, and that was one of the grounds on which I was so long in coming round to the conviction that the system ought to be changed; and if the furnishers of materials at Birmingham had completed their contracts, I believe that instead of doing what I believe to be right in upholding a change, I should be found honestly and explicitly stating that I saw no reason for a change, and that with a small addition to the manufacturing power that we had in our hands, all might do well. But I confess that, between the 6th of October and the present time, the case is so materially altered, that I feel quite justified in the change of opinion at which I have arrived.

3101. And you have come to that conclusion because you have not been able to obtain an immediate supply of arms, under circumstances of extraordinary pressure?—No, my opinion is formed on our not being able to get a portion of those arms that we have contracted for; the real change is because the contracts we made have not been completed. I conclude that, as the gentlemen who have taken those contracts must have an interest in completing them, they have not the power to do so, which I did not believe till this failure took place.

3102. It was proved to the Board of Ordnance, upon the question of the severity of the view, that there were various complaints made as to the conduct or misconduct of your then inspector?—Yes.

3103. The cause assigned for the supply of arms being small was, that the view was so unnecessarily vexatious, that the men could not supply them at the rate required?—Yes, I remember that being stated; but I must remind the Honourable Member that the then Master-general of the Ordnance, sitting in a judicial capacity, heard the whole of the allegation, and that he finally, as I have stated before in my evidence, in his own words, dismissed the case, saying that he saw no reason to believe that Mr. Lovell had done more than exercise a just and strict and impartial view, as was his duty to do; that was the conclusion at which Lord Hardinge arrived.

3104. Notwithstanding that, did he not concede this to the manufacturers, that they should have some person to appeal to in case of disputes arising between them and the inspector?—Yes; and the assistant inspector, who was not resident at Birmingham at that time, because the principal part of the work was transferred to Birmingham, was sent down to reside there.

3105. There was a person appointed to be referred to in case of difficulty or dispute?—Yes, I have stated that before.

3106. Did you not find, in consequence of the appointment of that person, that the supply was improved?—Yes, I think it was; but then I expected that to be the case, because if you commence setting up an arm, there will be certain difficulties, if it is of a new construction, and those difficulties will be got over in time. I really did think, in 1851, that finally we should come to the same wholesome state of things that we had been in about the percussion muskets; therefore it was with more surprise that I observed, in 1853, that we could not get materials for setting-up 6,000 stand of arms in six months.

3107. I presume from your experience with regard to the musket that you did obtain, you had no fault to find with it?—I have expressly stated that I believe it is the best musket in the hands of any troops in the world; and I would only add to that, that though no Birmingham musket has been presented to this Committee, and the muskets that have been presented were made at Enfield, there is no question upon that ground. I concede that the work is done as well at Birmingham as it is at Enfield; at least, it can be done, though in some instances it has not been done.

3108. You heard all Mr. Anderson's evidence, did you not?—Yes, I heard a great part of it.

3109. You heard him detail his plan, did you not?—Yes, I heard enough to form a general idea of the plan.

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3110. It is upon his evidence, is it not, that you rely for the great advantage to result from carrying out the Government plan as regards the supply of arms, and the saving?—Not entirely upon his evidence; I have stated before, that I take Mr. Anderson's plan to contain within it sufficient elements for coming to a decision, and that decision is strengthened by knowing that materials for small arms are got up by machinery in America, in Russia, and also in Belgium.

3111. You have never seen any arms that have been made by machinery in America, have you?—No, but I have paid sufficient attention to gun-making, and to work done by machinery, to come to this conclusion, that you may do a very large portion of the work much more cheaply by machinery, and that in many cases machinery would finish the work sufficiently well for military purposes; and if it was required to carry the finish further, you might give it a final touch by hand, if you required a higher degree of perfection than machinery would give it.

3112. Have you ever seen any guns that were made in Russia by machinery?—No, but I have seen plans of the machinery.

3113. You do not know to what extent they carry the machinery, or what manual labour they use afterwards?—No; but I see that it is quite possible to carry out a large portion of it by hand, and a still larger by machinery. I have heard, but I am not particularly desirous about it, and I think it is quite possible, that a barrel may be improved by other means; still I think that you may get a sufficiently good barrel for military purposes by the present system of rolling, though nothing can certainly be more imperfect than the present system of dealing with the barrel; you bore it out, and then shoot it, and you find that there are errors in it; you examine it, and you find there are interior projections, and then you take a hammer and beat them away. It is what you may say a corrective trial by a system of errors; and after you have beaten out one set of errors, you look into the barrel again, and perceive that another set of errors has been engendered in the correction of the first. Although I quite concur in the opinion that I have heard given, that it would be an extremely difficult thing to correct it, still I do see that our present mode of proceeding with the barrel is an imperfect one.

3114. Admitting it to be a system of errors, which I think it ought not to be, will any other plan which it is proposed now to work upon get rid of that system, if it cannot be done now?—The boring would be very expensive, and I think that barrel-rolling would be a sufficiently good system for military arms, but in America they bore their perfect rifles out of a solid.

3115. Do you think it a necessary consequence, that because a barrel is bored out of a solid it is a sounder barrel than if it was forged?—They do find it so. Persons who bore rifles consider (I do not say that it is the fact) that it is a more perfect, though a more expensive way of boring a rifle; it would not do for a musket, because the cylinder would not bear the pressure.

3116. Would it be as economical to bore a musket out of the solid?—No. I think that barrel-rolling may be carried to a sufficiently perfect state for military arms.

3117. Would you, to obviate the objections to the present plan, bore all the guns out of the solid?—No, I have not said so. I have said that I was satisfied with the system of rolling.

3118. Do you think that necessarily rolling the barrels makes them imperfect in the inside?—No; but I know that many of them are so. I know that great gunmakers, when they wish to correct those evils, do it by a succession of percussions; blows from without, which I call a system of trial by error; they hammer out one evil and engender another.

3119. I presume you mean that they hammer a small portion of the exterior of the barrel into a hole that wants filling up?—Yes; and that throws out lumps in other parts of the barrel.

3120. Is that necessarily the case?—I think so. I have had that explanation given to me.

3121. Supposing that to be the case, and supposing that those faults are got rid of by the plan you describe, and that the barrel is afterwards turned, and found to be perfectly clear inside, and perfectly clear outside, and to stand the proof required, what is the matter with the barrel afterwards?—I do not find any objection to it, only I think that a more perfect plan might be devised.

3122. Can you tell the Committee what that plan would be?—No; I think

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it is possible that by boring from a solid a more perfect barrel might be obtained. I observe that in the turning, as we do, of heavy pieces of artillery, and the boring out of heavy pieces, we gain a cylinder of great perfection; and we see, again, that in the cylinder of a steam-engine, which requires great perfection, that system of boring produces a more perfect one than is obtained in a gun barrel.

3123. Is not a gun barrel made of wrought iron, and a cannon of cast iron?—Yes, there is that difference.

3124. And another difference is, that after a gun is cast no pressure upon the cast iron can make it sound; but a gun that is rolled out, of wrought iron, undergoes great pressure, which makes it sound where it was not sound?—There may be something in that, certainly.

3125. You stated, did you not, that you rested your faith entirely upon Mr. Anderson?—Pardon me; I said that I rested my faith upon Mr. Anderson, believing him to be very able and skilful as an engineer, in my estimation; and what is more important than that, a man of considerable judgment; and then I also found it upon the fact that I observe that the American government has two manufactories for constructing small arms by machinery; and I look upon it that the American government is so shrewd, and so closely looked after, that if it were not an economical plan they would not adopt it. Now I think that there is this to be considered with regard to the manufactory: it has been stated, and on the highest authority, that this country ought to have 450,000 stand of arms in store. I believe that that would not be a musket too much, if you depended upon hand labour; but if you had a manufactory, which we will say produced 30,000 stand a year, or 20,000, you might in a few months expand it to 120,000 or 150,000. Then I think it would be economical not to lay out, say 600,000 *l.*; but that would have to be considered in an economical view of the question; and I am sure if we could expand at once the supply from 30,000 to 150,000, then you need only keep 220,000 stand of arms in the Tower, besides those which are appropriated to the troops of the line, to the militia, and the volunteers.

3126. You propose to effect a considerable saving by keeping a smaller stock of muskets on hand?—Yes.

3127. If you keep a smaller stock of muskets on hand, and you embark capital in a manufactory quite equal to the difference in the amount of the stock, will you save anything?—I have stated that we should effect a saving of 600,000 *l.*, which would be locked up in the Tower and other depôts in muskets; but the manufactory which we propose to put up would not amount to one-third of that. It is contemplated that it should not exceed 150,000 *l.*; but putting it at 200,000 *l.*, then you would save 400,000 *l.*

3128. No, you would save the interest of that?—If you were to make the muskets you must spend the money.

3129. You would have the muskets?—Yes, but the capital would not remain in the pockets of the people, who have to pay taxes.

3130. Nor in the case where it is laid out in machinery?—But you would have less taken out of the pockets of the public then; instead of 600,000 *l.* it would be only 200,000 *l.*

3131. How do you arrive at that estimate?—I have seen some instances of Mr. Anderson's calculations which have convinced me that he is to be depended upon in machinery; almost everything that he has put up has fallen within the estimate; I am sure that if you take into calculation all he has put up, the sum total would fall very much short of the estimate.

3132. In this instance Mr. Anderson does not profess ever to have seen such machines used; in fact he knows very little about them; do you think that you can depend upon any man's estimate under such circumstances?—I can only depend upon him by looking to what he has done. I was going to state that one of his inventions, which is a most beautiful machine, I saw grow out of his brains step by step; I never intimated to him my expectation that he would fail, but I did certainly apprehend that he would not succeed, and I now find that this machine is at work producing in each day's work from 140,000 to 150,000 bullets a day. The number of men required to produce the same quantity would be 225 a day, and my belief is that we should not be able to provide the ammunition to go out with the intended expedition to the East had it not been for him; and I know from experience that we could not have sent a sufficient

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quantity of ammunition with the muskets which have been altered to the Minié from the 1842 pattern, to the Baltic fleet, but for that machine.

3133. Before this machine was made, how did you make the bullets?—By casting.

3134. How were they made between the time when they were cast and the introduction of this machine?—By compression. It does not produce the same quantity; it is not applicable to elongated bullets; it makes the round ones very well.

3135. Had you never had any long bullets made before by compression?—No, not before; not by compression.

3136. Is it possible that they might have been made by compression without your knowing it?—We did not make them.

3137. Has there ever been a machine for making bullets by compression at Woolwich, which was used for some time before Mr. Anderson's machine?—Yes, but it was totally different; it was a mere case of pouring in the lead, and compressing it so as to bring the air in the interior of the bullet into the smallest possible compass.

3138. For Minié balls?—No.

3139. Had they not been made before at Woolwich?—We make them by pressure now; but they are finally shaped by this machinery.

3140. Before this machinery was made, were not Minié rifle balls made at Woolwich?—Not by machinery.

3141. Do you agree as to the alterations proposed to be made in the guns by Mr. Anderson to make them more suitable to machine work?—I spoke to him, and he said that if it was determined that the gun should retain its present shape, it was quite within his power to adapt machines to produce it just as it is; but that if it were desired to have a less costly gun, and if the alterations in the form that he proposed were not objected to by the military service, then he thought that he could bring about a greater saving in the construction of the gun than if he adhered to the present form.

3142. Then if the same alterations could be made to suit the machine work, they might as well be made to suit the present work, might they not?—Certainly not. I am not sure that the same degree of saving would be obtained in working by hand if you were to alter the forms. I do not think that there is anything particularly difficult about the present forms for handwork.

3143. If there would be a saving, would the Ordnance object to alter it?—If it could be shown that there would be a saving by altering the forms, when the Committee on Small Arms met the case would have been considered, and if it could have been adopted without injury to the arm, it would have been adopted, because I do not think that we are tied to any particular form. I recollect when the butt was much more square than it is, and I have seen various changes in the forms of the arms of the country.

3144. With respect to Colonel Colt's pistols, you stated before, did you not, that you had bought a quantity of pistols of Colonel Colt?—Yes.

3145. I presume that the way in which it was done was, that he gave you a pattern, and undertook to make the pistols according to that pattern?—No. I happened to be, eight days before the contract was made, at the Admiralty, and I met Sir Charles Napier there, in the presence of Admiral Berkeley, and he stated that he was particularly anxious to obtain some of Colt's revolving pistols. The Admiralty considered this request; and I replied that if the Admiralty determined upon the pistols being supplied, I had little doubt that the Ordnance would be able to obtain them before the fleet sailed. In about four days after that the Admiralty signified their wish that those arms should be supplied. The Board of Ordnance took steps to see whether they could find those arms, and I applied to Colonel Colt to know whether he could furnish them, and he said that within 10 days he would send us down 1,500 of those revolving pistols, with flasks and bullets, and spare articles for the locks, and everything complete, as he was in the habit of furnishing them to the American Government. Upon that, I brought the case before the Board, and it was determined that Colonel Colt's offer should be accepted. I should add that Colonel Colt's pistol, and the pistol of Deane & Adams, and various others, were brought before the Board for examination and trial by the Small Arms Sub-Committee; and the pistol which we have accepted is one very much lower in price than any other. I observe that I heard a much more experienced person than I am speak about the

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the lock of Colonel Colt's pistol; I do not think that he had quite well considered the thing. The Committee will observe the position of the lock in this case (*pointing to the musket*); it is a side lock; here, in the pistol, the whole apparatus of the lock lies behind; and I need not remark, that in forming an opinion of those two locks, so essentially different in position, the principle and adaptation must necessarily be very different. There is no analogy, I observe, between them; you cannot compare two things so different in principle, one of which has been to meet a special case. The revolving cylinder forbids the use of the ordinary side lock. This is essentially a better lock (*pointing to the musket*); but the lock in the pistol is behind the barrel instead of at the side, and it is so made that it will stand the service which it is likely to be exposed to.

3146. Lord *Seymour*.] That is not one of Colonel Colt's pistols, is it?—No.

3147. But the Committee are to understand generally, with regard to Colonel Colt's pistol, that you disagree with the evidence that has just been given by the inspector of small arms?—Yes, I do; I think that the position of the locks is essentially different, and it would be absurd to apply Colonel Colt's lock to the other arm; but it is possible that it may be a useful application.

3148. Have you examined the interior of Colonel Colt's pistol?—I have looked at parts of the lock.

3149. Do you consider the parts to be good?—Yes, to be perfectly efficient and useful for the purposes intended.

3150. If the pistol was sent to you at the Ordnance, supposing an appeal to be made to the Board after it had been viewed and rejected, would you admit those parts?—So entirely is that the case, that I have sanctioned a supply of those pistols to the navy, and Mr. James Gunner, who will be produced, will show the Committee that he was sent to examine those pistols, and he perfectly concurs in all that his father says about them; he considers this lock, as I do, inferior to the Minié rifle lock, but perfectly adequate and fit for all the purposes for which it is intended.

3151. Mr. *Muntz*.] The lock may be perfectly adequate in each case; the lock at the back of the pistol may be in a different position from the other, but that is no reason why the quality of the work should not be equally good?—I have said that the work is not so good, but the shape of the interior of the pistol lock differs from the interior of the musket lock, and a different arrangement was required.

3152. The quality may be inferior or superior, though the forms may be entirely different?—I have admitted that the workmanship is inferior, but fully equal to its work; but I think that the inspector of small arms has not observed that those two cases are not analogous.

3153. Lord *Seymour*.] The chief object that you have in view, as I understand, in the proposition made on the part of the Ordnance, is to attain the most expeditious mode of providing small arms?—And efficient arms.

3154. But one great object is expedition?—Yes.

3155. And you have been guided very much by the confidence that you have in the statement of Mr. Anderson?—Partly, but not only by the statement of Mr. Anderson. I beg to be permitted to express my own opinion upon that; I attach great importance to Mr. Anderson, but in looking over what has been done elsewhere, I came to this conclusion as to what can be done here.

3156. Mr. Anderson has stated to the Committee that he is not satisfied with the present mode of making barrels?—I differ from him there; I am not quite satisfied, and I think it may be improved, but I think that the present system is sufficiently good for military arms.

3157. For many other parts of the arm machinery is not made, but has to be invented?—Yes; but according to Mr. Nasmyth, who is one of the most able men in this country, it may be done; I may say that he touches nothing that he does not adorn. He is both a mathematician, an astronomer, a planner of machinery, and engineer; he is also a man of extensive scientific attainments, matured by long practice; deep reflection, matured by extended travel and observation in all the great arsenals of Europe.

3158. According to the evidence of Mr. Anderson, it will be necessary to invent much of the machinery that is to be used?—I do not entirely agree with that; I believe that it will be necessary to improve much that has been invented, and apply it to the making of small arms.

3159. A witness of considerable experience in new machinery told the Committee,

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mittee, that in constructing new machinery it would be advisable to allow double the time and double the money before the machinery would be obtained; do you agree with that?—I should beg leave to say that I am an officer of the navy; I am no mechanician, and I should recommend, if the Committee permit me, that they should take the opinion of engineers on those things; I shall be happy to give my opinion on small arms.

3160. With regard to economy, you stated that you were guided in that by the great shrewdness of the American government in their mode of obtaining arms; it has appeared from Colonel Colt's evidence that the shrewd government of America are now paying 2 *l.* 10 *s.* for a musket; are you aware of that?—I do not recollect Colonel Colt saying that; he told me distinctly that the muskets in America were made as low as 37 *s.*

3161. Mr. *Monsell.*] That was in the government manufactory?—Yes.

3162. Lord *Seymour.*] I will quote to you his own words. He is asked, "If the Government purchase it, what price do they pay?" His answer is, "That depends a little on the market, and just now it would be more than at another time." His examination proceeds thus: "What do they give at the time? The latest contract price would vary between 10 and 12 dollars, where a man finds his own capital.—Is that about 2 *l.* 10 *s.*? Yes; his own stock and his own brains; he has to pass the same inspection as at the national armoury; in round numbers it would be about 2 *l.* 10 *s.*"?—Then, if I understand rightly, that is not in the government manufactory, but when the work is from contractors. This is a question of fact: Colonel Colt expressly stated that the arms in the manufactories to which I have alluded were made for 37 *s.*; I did not allude to those contracts, but to those made in the Government manufactories; I knew nothing about those that were purchased, and the comparison in my mind was, what would be the cost to the American government of arms produced in their manufactories, worked by machinery; and to that I think Colonel Colt distinctly stated that the price would be about 37 *s.*

3163. But Colonel Colt said that the Government of America considered it a matter of policy to purchase arms as well as to manufacture them; do you agree with him in that as a matter of policy?—Yes; I think that it may be a very useful thing for that government.

3164. Though you state that they manufacture arms at 37 *s.*, it seems by the evidence given to the Committee, that they purchased muskets at 2 *l.* 10 *s.*—Yes.

3165. If they can manufacture them at 37 *s.*, do you think it an instance of good management to purchase them at 2 *l.* 10 *s.*?—Yes, I even think that it is. Supposing that the machinery would not give them all the muskets that they wanted, then I should think if they could not get them at 37 *s.*, it would be advisable to get them for 50 *s.*; to make as many as they could, and having worked up to the full extent of their machinery, to go to the next cheapest market to supply their want; we do that every day.

3166. Mr. *Muntz.*] How many pistols did you buy of Colonel Colt?—We are to buy altogether 4,000.

3167. At what price?—Fifty shillings per pistol.

3168. Mr. *Newdegate.*] You stated that you thought one great advantage which would result from a Government manufactory would be, that you would no longer be required to keep a large stock of muskets?—One of the advantages.

3169. Supposing that you continued with a stock not equal to one-third of the stock that was in the Tower previously to the fire, and there was a sudden emergency, such as the prospect of an invasion, of what use would the manufactory be to you if you could not fill up the stock in less than a year?—I take it that you would get about 12,000 arms in a month. Suppose that questions of war or peace had been pending six months, 6 times 12 are 72, and that would be 72,000 stand of arms in six months.

3170. Is that the rate of production upon which you calculate from the new manufactory?—I think it is about that; the manufactory would produce 150,000 stand a-year. Then you see, I have put it under that for simplifying the thing in mental calculation. I put it at 144,000; 12,000 a month; and 12,000 a month would be 72,000 in six months; and we have been, in six months, not getting 6,000 sets of materials.

3171. Supposing an emergency became pressing in six months, you still would not be in so safe a position as if you had a store of arms?—No, certainly not.

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If we had them in the Tower, they would be better than if we had them in the shape of iron and wood.

3172. In trusting to the manufactory, instead of providing a proper store, would you not be incurring a certain degree of risk?—No, I really do not see that exactly; you have not so many arms, but you have 200,000 stand of arms, and the power of making 72,000 in six months; and I do not think that that makes it too much a matter of risk.

3173. There would be some additional risk in the interval, would there not?—You would not have so many arms. Supposing the militia, and the pensioners, and the regular troops were all supplied with arms, then I think that, with 200,000 stand in store, with the power of making 72,000 in six months, there would be no great risk.

3174. Would there not be some risk, in the absence of a sufficient and immediate supply of arms?—I think it would be infinitesimal.

3175. Mr. *Monsell.*] You have spoken of the gun manufactory in America; will you state to the Committee whether the Master-general and Board of Ordnance had arranged that competent persons should proceed to America, and there acquire models, and consider generally how far the machinery that they saw there could be improved?—Yes.

3176. Can you state why it is that Mr. Lovell does not appear before this Committee?—I am sorry to say that he is in a very ill state of health, and in all probability he will not leave his house again.

3177. Mr. *Geach.*] You heard the evidence of Mr. Whitworth and Mr. Prosser, did you not?—I did.

3178. After hearing their evidence, are you still as confident as you were that in 12 months, or, take an extreme time, two years after the establishment of your manufactory, you will be able to turn out 72,000 Minié rifles in six months?—I believe so. Putting together all that Mr. Whitworth, Mr. Prosser, and Mr. Nasmyth have said, my opinion remains unchanged. I know that we could get a contract to-morrow, under binding terms, to complete the building and the machinery within the time.

3179. Mr. *Muntz.*] That is the smallest part of the matter?—Yes, it is a small part. I would now beg to hand in the Returns which I have produced to-day (*the same were handed in*).

Vide Appendix.

Mr. *Charles Millward*, called in; and Examined.

Mr. *C. Millward.*

3180. *Chairman.*] YOU are a gun-barrel maker at Birmingham, are you not?—Yes.

3181. Mr. *Muntz.*] You are one of the contractors for the Minié rifles?—Yes.

3182. You contracted, in the first instance, for the order in 1851, did you not?—Yes.

3183. Is the statement correct that the order should have been completed in February 1852, and that it was not completed till June?—It was so agreed.

3184. How do you account for the delay?—It was in consequence of the very extreme severity of the inspection.

3185. Was it in anyway to be attributed to bad iron?—In a very small degree compared with the quantity refused.

3186. What proportions had you rejected out of what you first sent down?—The first lot that I sent down was 120 barrels, after seeing the patterns, and I had 98 of those passed, and 22 returned. The following week I sent down 109, and I had 65 returned and 44 passed; and each week following that, for some time, I had about the same ratio, about 70 per cent. rejected after the first lot that I sent down.

3187. Do you know whether the rejections were equally heavy with other barrel contractors?—As nearly as possible the same per-centage throughout.

3188. Mr. *Dundas.*] Was that a final rejection?—No. They were rejected for trivial matters in the barrel that were not at all detrimental to the service. They were sent back in a litigious way; they were not absolute waste.

3189. Lord *Seymour.*] They were not rejected in reference to the bad quality of the iron?—Some of them were, but a very small per-centage of what we had returned.

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3190. Those that were returned for the bad quality of the iron, were completely rejected, were they not?—Yes.

3191. Others were rejected for the form?—Yes, the outside occasionally, but more particularly for the inside.

3192. Can you state of this 70 per cent. that were rejected, how many were rejected for the inferior quality of the iron?—I should think about 10, from that to 15 per cent. in the first commencement of the order.

3193. *Chairman.*] Did they state what they were rejected for?—No.

3194. Then how do you know that 15 per cent. only were rejected for the inferior quality of the iron?—That is chalked in a different way; where there is a flaw in the iron it is chalked round, which shows where the defect is; for the other matters, for the inside, they take the chalk and draw it round the barrel; if it is outside, it is chalked crosswise of the bar.

3195. Lord *Seymour.*] Do you object to the system of rejection where the quality of the iron is bad?—Not at all; where the quality is bad we expect to have them rejected. It is a matter that we cannot always foresee till we have finished it.

3196. So far as the rejection was made, that portion of it, you agree, was fair and just?—A just rejection.

3197. Mr. *Muntz.*] How did those rejections contrast with the rejections previously to 1851?—At about the rate of 70 per cent. compared with 20 or 25 per cent., and then they increased from 25 to 70 per cent.

3198. Do you mean to say that if the view had been as fair as formerly you could with ease have fulfilled your contract?—With ease.

3199. What were the principal causes of those rejections?—The principal cause was for the insides; it was stated that they were crooked.

3200. Did you complain of such a view to the Board of Ordnance?—We did.

3201. And was there any difference in the view after the complaint was made?—A marked difference, as the table here will show.

3202. Will you just explain it to the Committee?—It commences by saying that after the first lot, I had at the rate of 70 per cent. rejected, and it follows as near as possible down to March the 29th at that rate. On April the 5th I sent down 120 barrels and I got 22 rejected only; that was the first view after our interview with the Board.

3203. Mr. *Walpole.*] You have not given the date of the interview?—It was about the 20th of March, as near as I can remember; I was one of the deputation.

3204. In what year was it?—In 1852.

3205. The dates all refer to the year 1852?—Yes.

3206. Mr. *Muntz.*] And you are referring to the order given in 1851?—Yes.

3207. In what period was there a sufficient number of barrels passed to enable the setters-up to have a delivery?—I should say in about three months from the reception of the order.

3208. How many?—About 5,000 barrels.

3209. Within three months from your reception of the order?—Yes; they were marked.

3210. Can you tell the date of the first deliveries to the setters-up?—Not exactly, but I have understood that it was in February or March 1852 that they received the first supply.

3211. What was the date at the end of the three months when you say they were ready for delivery?—That would be in September, at the end of the month, about 5,000.

3212. In 1851?—Yes.

3213. And they were not delivered to the setters-up till when?—Not till February or March.

3214. What was the reason of that?—That I cannot explain.

3215. Did you never hear any cause assigned?—I did hear from the setters-up that it was in consequence of their being retained at the Ordnance Department in Birmingham to have the lumps cut by some machinery that they had of their own; I have heard them say so.

3216. There were Minié rifles ordered again in October 1853, were there not?—That is the order that we are now at work at.

3217. Was there much delay at the commencement of this order?—There was some delay, more than we anticipated when we took the order.

3218. What did that arise from?—Principally in the arrangement of our tools and machinery to commence making those barrels.

3219. Were they materially different from the order of 1851?—Entirely.

3220. What was the difference?—The barrel was considerably smaller in bore, less on the outside, square at the breach end, reaching six inches up the barrel; all of which it was essential that we should alter our machinery to meet.

3221. Had you to alter your rollers?—We had to turn them, and to alter the lathes, and also to settle the prices for the different parts with our workmen.

3222. Can you state the monthly delivery of barrels from the receipt of the order down to the present time?—I will explain that: in consequence of the alteration of the machinery, we called upon the Board to extend our time a month beyond the time first agreed for, stating at the same time that that should not interfere with the ultimate completion of the order, and that was granted to us. Our first delivery should have commenced on the 15th of December 1853, and at the end of that month we had delivered 518; at the end of January we had delivered 1,301; at the end of February, 2,286; and by the end of this month we shall deliver 4,000 more, at least.

3223. What was the whole order for?—Twenty-three thousand.

3224. When is it to be completed, according to the contract?—It extends to about June.

3225. Shall you be able to deliver it in the time?—Yes, long before the time, if we get a supply to keep up the stream that we have now established in our manufactory.

3226. *Chairman.*] A supply of what?—A supply of orders. We are in precisely the same position in making the barrel as the Government is in making the gun. We first have to get the iron and arrange our machinery; we have then to get a supply to carry on a particular process, and we have then to get a full supply in another process; if we keep that up we can produce a large quantity; but if we are getting to the end of an order, and have to diminish the supply in the first instance, it retards very much any subsequent order, and we have to make again the same start.

3227. Mr. *Muntz.*] Do you remember that when the last order, or the previous one, was given out, there was a memorandum on the contract that further contracts would be entered into?—Yes.

3228. Was any explanation given to you as to that?—No explanation; it was not explained whether it was to be by tender, or whether this order was to be finished first.

3229. Was it explained to you whether the old principle, that the whole of the contract should be completed, was to be acted upon, or whether each contractor was to expect to have a subsequent contract when his contract was completed?—I never heard it so explained.

3230. You feel satisfied that you could complete your delivery in the same proportion as you have hitherto done?—Yes, to a certain extent.

3231. You will be able to complete your contract within the time?—Yes, long before the time.

3232. Has there been any improvement, or any more correct principle introduced as to the view, since the appointment of Mr. Gunner?—Yes; we have had fewer rejections since the appointment of Mr. Gunner.

3233. Does the same particularity of view go on, but not in a vexatious manner?—Yes.

3234. Then the statement that has been made, that you have only delivered 1,820 barrels, is not correct?—I do not know when the date is taken from, but if from this month, it is certainly not correct.

3235. Did you not receive notice that you were 37 barrels deficient, and that you would be charged 1 *s.* a piece in consequence of that deficiency?—Yes, from Mr. Lovell; and I called upon Mr. Lovell, or I called to see him, but he not being there, I saw his clerk, and explained to him that at that time I had more than 150 barrels standing ready to be viewed, and that some had been there for seven or eight days.

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3236. Why had they been standing there?—The only remark that I heard made was, that they had not had time to do them.

3237. Who sent you the notice?—Mr. Lovell.

3238. Did you explain this to him?—I explained it to Mr. Pellatt, the clerk.

3239. What did he say?—That he would see that they were put up.

3240. Was he aware that they were standing there?—He did not say.

3241. Did he know that a note had been sent to you?—I showed it to him.

3242. You feel satisfied that you can complete your contract within the time?—Yes.

3243. Did you ever meet with any opposition to the introduction of machinery in your work?—Not exactly to machinery. I have met with opposition some time ago, with reference to some labour-saving machinery. I heard Mr. Nasmyth examined the other morning, and he produced an article that was rejected by the viewer, Mr. Lovell, some years ago.

3244. What was it?—I will explain that: in 1842 we had some difficulty in getting one matter connected with the barrel forged, which is the breech pin, and we at once resorted to getting them stamped, which is the same process that I mentioned.

3245. That which Mr. Nasmyth exhibited as being a novelty?—Yes; we put some into the barrels and they were rejected; the viewer saying, that as long as we used stamped pins our barrels would not be taken. These are some of the very pins that we had (*exhibiting the same*).

3246. Did they object to them in consequence of their want of quality?—They told me at the time that they objected to them because they would not stand the bending sufficiently to fit the jig; that is, the end of the stock.

3247. Had they proved that to be the case?—Not that I am aware of. I took one of the pins down and bent it as you see this (*describing the same*), but it had no effect; we could not use them; and from then to the present time we have used forged pins.

3248. How did they know that you used stamped pins?—I suppose from the workmen.

3249. Was there any pretence made that the appearance of the pin was objectionable, or its strength, or durability, or usefulness?—Nothing further than that they supposed they would not stand the bending over the stock, being stamped out of one body, though this pin was bent to show the fallacy of the argument.

3250. After that was done, did they still refuse to receive the stamped pins?—Yes; from that date to this we have used forged pins.

3251. Mr. *Monsell.*] Did you appeal to Mr. Lovell on that subject?—Not personally.

3252. Nor to the Board of Ordnance?—No.

3253. Do you state that you offered the pin made by machinery for view?—Yes; several went down to view.

3254. And none of them were passed?—I am not aware that any were after they knew we were using stamped pins. I was sent for, and informed that, if I used stamped pins for the barrels, my barrels would not be received.

3255. You were so informed by the viewer, and you made no appeal to Mr. Lovell, or to the Board of Ordnance?—Personally I did not; I am not aware whether any other contractor did so.

3256. Lord *Seymour.*] Can you state what the difference in the cost of producing the article was by machinery as compared with being forged by hand?—We had great difficulty in getting them forged. I found that it was something like one-third less.

3257. In point of time it made a considerable difference, did it not?—In point of time it made the most difference.

3258. Mr. *Monsell.*] Do you think that the article produced by machinery would be as good as if produced by hand?—I think it is quite as good as one produced by forging.

3259. Have you any other machinery in your establishment?—Yes.

3260. Has it answered well?—Yes.

3261. Have the articles that it produces been as good as those which are produced by hand?—Yes, and in some cases better.

3262. And there was a considerable reduction in price?—It saves labour, and consequently is cheaper.

3263. So far as your experience goes, you are entirely in favour of machinery, are you not?—So far as my experience goes as a barrel maker, I am satisfied that it is a good plan.

3264. Mr. *Muntz.*] There is a very small part of your work but what is done by machinery?—There is a very small part of our work but what is done by machinery and hand labour jointly.

3265. But you say that the great bulk of your barrel manufacturing is by machine work?—Yes.

3266. A statement has been made that there was a difference in your charges from 12 *s.* for a barrel in 1851 to 13 *s.* for a barrel in 1853; how do you explain that difference?—The barrel of 1851 was a different barrel entirely from that of 1853, which was narrow in the bore, and square at the breech end, which is expensive.

3267. That was the cause of the difference in the price?—Yes,

3268. Mr. *Monsell.*] What was the price at which your first tender for the barrel of 1853 was put in?—Fourteen shillings.

3269. What is the price that has been accepted?—Thirteen shillings.

3270. Mr. *Muntz.*] Supposing the barrels were made of the same shape as they were in 1851, could they be made at a less price than they are now?—The square of the present order is taken off, and already will reduce the price 1 *s.* 6 *d.* a barrel for removing that square.

3271. Mr. *Monsell.*] Would you be so good as to state the reasons that have prevented you from fulfilling your contract up to this time, and from delivering the number that you engaged to deliver?—As I have before stated, the delay has been in consequence of not getting a proper start.

3272. Has that been the only reason?—No; the first was, as I have stated, the difficulty in getting our machinery in a position ready for a start, and the next was the difficulty in settling the price with the workmen, which occupied us about three weeks.

3273. Has this difficulty with the workmen often occurred to you in your establishment?—Twice in my experience in barrel making; once in 1842, and once on this last occasion.

3274. Supposing you had a large order, which you were bound to complete within a limited time, do you think that the difficulties with the workmen, with the knowledge on their part that you had that order, and were bound to execute it in a certain time, would increase?—I should not think that it would increase the difficulties.

3275. Have you ever found that that state of things has increased those difficulties?—No, not in the barrel trade.

3276. Are you aware, that in other portions of the gun trade that difficulty has been found to be a very serious one?—Not in my own knowledge. I have heard it spoken of.

3277. You have stated that you have not been able entirely to fulfil the contract that you made with the Board of Ordnance; have you supplied any within the last month?—Yes.

3278. Will you state the number?—I cannot state the number.

3279. *Chairman.*] What number have you delivered up to the present moment?—Individually I cannot tell. I have not been at my works for the last nine or ten days. I have had some barrels viewed since then. I think about 900.

3280. Mr. *Monsell.*] How many were you bound to deliver per week?—Fifty the first four weeks, each week; 75 for the next four weeks; and 100 per week afterwards till I completed the order.

3281. *Chairman.*] When you last examined your books, what number had you delivered in?—Eight hundred and sixty-eight.

3282. What number at that time ought you to have delivered?—About 900.

3283. How many were you at that time deficient?—About 25 or 30 barrels.

3284. Mr. *Monsell.*] Has the machinery that you have already introduced into your establishment enabled you to dispense in any large degree with skilled labour?—In some degree it has.

3285. Could you mention the extent?—The machinery that we use in turning saves a considerable degree of labour; perhaps 30 per cent.

3286. And is the other 70 per cent. of the same sort of highly skilled labour that you had before been obliged to employ?—In making barrels there are four

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or five distinct trades; some which we use machinery almost entirely upon, others very little; where we are obliged to finish by hand, there we use nearly all skilled labour.

3287. How much of the 70 per cent. of the labour that you still employ is now skilled labour?—I should say at least 40 per cent.

3288. How much of the whole 100 per cent. was skilled labour?—Something like 80.

3289. Mr. *Walpole.*] You mentioned, did you not, that about 70 per cent. were rejected in the year 1852 down to the last week in March?—From the 14th of July to the 29th of March, my rejections were about 70 per cent.

3290. And you stated that your complaint was made to the Ordnance about the 20th or the 22d of March?—Yes.

3291. You also stated that in April (in the first week) the rejections were only about 25 per cent.?—Yes, and so they continued till we completed the order in June.

3292. Between the end of March and the completion of your order in June, was there any difference in the make of the barrels which you supplied to the Ordnance?—None whatever, and a great many of them were barrels that had been down before, and had been rejected.

3293. According to the best of your recollection, you think that if those barrels had been delivered before the end of March they would have received similar treatment with the 70 per cent. that had been so rejected?—Yes, I have no doubt of it.

3294. There was no alteration in the workmanship?—None whatever.

3295. Lord *Seymour.*] When you have finished the barrels in your establishment, do you send them to the Ordnance establishment in Birmingham to be viewed?—Yes.

3296. The viewer does not come to the premises to view them?—No.

3297. You make barrels not only for the Ordnance, but for other parties, do you not?—Yes.

3298. What is the system of view that they have?—The East India Company view their barrels in London; the others, private individuals, do not take any standard view.

3299. The East India Company receive them in London, and send back again to Birmingham those that are rejected?—Yes.

3300. Do you employ the same quality of iron for the East India Company?—Precisely.

3301. Can you state what per-centage you have rejected by the East India Company?—About 20 per cent.

3302. Are those that are rejected by the East India Company rejected from flaws in the iron, or are they rejected for other causes?—Some for flaws in the iron. We have one species of rejection in London that we never have in Birmingham, that is, barrels damaged in the conveyance from Birmingham to London.

3303. You have spoken of some being rejected on account of the inside not being quite even?—They are stated not to be quite straight.

3304. Is that view made merely by inspection with the eye?—There is no mechanical test to judge of the correctness of the inside; it is done entirely by the eye.

3305. Have you ever attempted to invent a mechanical test for the purpose of securing the straightness of the inside of the barrel?—I never have.

3306. Do you think that there are great difficulties in the way of that?—I do not see anything applicable to it at all, nor ever did.

3307. There have been no improvements in the boring of barrels for a long time, have there?—Nothing that I have heard of.

3308. Are you aware whether in any foreign countries, in America, or any other country, there are better systems of barrel-making?—I once saw a barrel that was stated to me to have been bored in America, of a very small bore, commonly called a pea rifle, and it was bored very accurately; and I understood that it was bored out of the solid, but it was an immense substance on the outside of the hole, and I understood that the barrel had revolved to bore that hole, and the drill was stationary; but I do not think that it could be applied to a barrel of wider calibre, unless they had an equal substance in comparison with the hole on the outside of the barrel, which would make it very expensive to reduce.

3309. Do you think that machinery could be applied more correctly to the purpose of barrel-boring than it is at present?—I was speaking with an engineer or machinist the other day, and his opinion was, that some improvement might be made in rough boring, but he did not suggest anything to me in fine boring, which is the turning of the inside where the difficulty exists.

3310. How is fine boring done at present?—It is done by a revolving bit being placed into the barrel, which is placed in a socket; there is a bit made with two cutting sides, and two sides that do not cut, and on one side is a piece of deal to polish it as it goes on; the size is enlarged by small pieces of paper being put under the spill to make it accurate. It is a long cutting bit.

3311. Are the barrels rifled in your establishment?—No, that is done in a separate trade.

3312. Do the East India Company contract in the same way as the Government for the different parts of the musket?—The India Government have contracted with the same parties since my recollection.

3313. Do they not contract for the entire musket, and not for the different parts?—For the materials.

3314. Which they give out again to be made?—Yes, to the fitters up. In some cases they contract for what they call fuzill guns, that is, a different description of gun, and the gunmakers find the materials.

3315. With your experience of the gun trade, do you think it a good system of contract to contract for the parts, or do you think it would be preferable for the Government to contract for the musket entire, and to leave the person who entered into the contract to supply the parts?—That depends entirely upon the way in which the Government intend to view the work when so contracted for. It is absolutely necessary that the materials should be examined before being fitted into the gun, or much expense and loss of time would be incurred in case of any waste of material after it was fitted up.

3316. If the parts are to be viewed separately, are the Committee to understand that you think it would be better to have the contracts separate?—Yes.

3317. Mr. *Monsell.*] Supposing the Government were to contract for the whole musket, how would the person contracted with get his materials?—I presume from the material makers.

3318. Would he view them as they were brought in to him?—I have no idea.

3319. Would it not be essential for him, in order to protect himself, to have a close view of the materials when they were brought into his workshop?—I think so.

3320. The Government then, I presume, would find it necessary to have their view?—Yes.

3321. Therefore the proceeding, by contracting for the whole musket, would involve two views instead of one, and it would increase the number?—The number of views would be the same as now, each material would be viewed before it was set up.

3322. Would it not be viewed first by the contractor, and then by the Government, when brought into their establishment?—Yes, no doubt.

3323. Mr. *Newdegate.*] Is it not the case now that those who buy the parts of the musket view them themselves before they submit them to the Ordnance?—Yes.

3324. Then one contractor undertaking to produce the whole musket would cause no more viewing than exists now?—If the Government insisted upon their view, and the contractor was to insist upon his view, the material makers would be subject to two views.

3325. You suppose that there would be another view in that case?—In that case necessarily so.

3326. Is that a necessary consequence?—I apprehend so, if we are to get the same view from the Government, the material makers taking a view too.

3327. Lord *Seymour.*] Do you have any view in your own establishment before you send the barrels in to the Government?—I generally look them over myself.

3328. Upon that inspection which you give them, do you put aside many?—Many; in every stage of the manufacture there is a portion of waste that it is impossible to avoid.

3329. Mr. *Monsell.*] Do you put aside the larger number in the case of those parts

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parts that you make by machinery chiefly, or those that you make chiefly by hand?—Principally of those that are made by machinery.

3330. You find the machinery less accurate than the hand work?—Not of necessity so, or that it should be the cause of rejections, but in the process of the manufacture we often come upon flaws and things in the iron and other matters, where the machinery gets a little out, and throws it off the centre; a case will occur now and then to make such waste.

3331. So far as flaws go, the one process would be the same as the other?—Precisely.

3332. Colonel *Dunne.*] Can you tell the average number that are put aside from barrels generally?—In the line musket, the average quantity put on one side ranges from 15 to 20 per cent.

3333. You state that you view in your own manufactory?—Yes.

3334. Can you state what is the average that you yourself put aside in the ordinary manufacture of barrels?—In the best sort of barrels, five or six per cent.

3335. Mr. *Muntz.*] You stated just now that a certain number of barrels which had been rejected by the viewers, had been returned to you, and afterwards sent down to be re-viewed; were those barrels altered by you before they were re-viewed or not?—Some of them were not altered at all, others were.

3336. Still they were accepted by the viewers?—In the same ratio in which they had been received before.

3337. Then there was no fault in them, or if there was, the viewer did not do his duty?—One of the two: it was the same viewer.

3338. With regard to the artillery carbines that were ordered in 1853, why were they not delivered in June 1853?—We received the order on the 4th of April 1853, and we got the pattern for that barrel on the 7th of May; I did not get it till the 15th, in consequence of only one pattern coming down amongst seven contractors.

3339. What was the reason of that?—The reason stated was, that they could not make two alike.

3340. They expected you to make them all alike, did they not?—Yes.

3341. When was that order completed?—In August.

3342. When did you get your pattern?—In May.

3343. How long a period were you to have to complete them in?—I think six weeks.

3344. Did you complete them between May and August?—Yes, the latter end of August.

3345. In three months?—Yes.

3346. Do you know when the setters-up got any to work up?—In November.

3347. What was the reason of that?—I cannot tell, unless it was that they were retained at the Ordnance Department, to do the necessary machine work, which they do themselves.

3348. Mr. *Monsell.*] You are not aware of that fact?—No.

3349. Mr. *Muntz.*] What was the price of the barrels?—Ten shillings and sixpence each.

3350. A statement was made the other day with respect to the price asked for barrels being 21*s.*, and that the contract was afterwards taken for 13*s.*; how do you explain that discrepency?—That statement was only a part of the truth. I will give the Committee the whole of the facts, as far as I can.

3351. Mr. *Monsell.*] That was in 1839, was it not?—Yes; in 1838, the Government arranged to change the whole arms from flint to percussion. There had been nothing done in the barrel trade for the Board of Ordnance for 15, or 16, or 20 years before. Mr. Manton, the then inspector, came down to Birmingham, and requested the barrel-makers to give him the price of the article that he had then with him, which was a very superior barrel: far superior to anything that had ever been made for a military barrel before; and the barrel-makers on that occasion requested permission to make a few before quoting the price, which was refused them, Mr. Manton suggesting that they should leave a wide margin, and that they would be put right hereafter, for he must take the price for it. In consequence of that, 21*s.* was asked merely as a nominal price; it was so understood by the trade, and so understood by Mr. Manton. They were afterwards taken at 12*s.*, and after that the Government advanced them to 13*s.* Here is Mr. Manton's letter, wherein he refuses the barrel-makers to make a few before quoting the price.

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3352. Mr. *Muntz.*] Will you read that letter?—"Small Grove Office, Tower, 19th September 1838. Sir,—I have to inform you that 2,000 of the new pattern musket barrels are required to be supplied in two months, the pattern of which you may see at the view rooms, Birmingham; and I have to request that you will send me a tender for the supply of either the whole quantity in that period, or any number, not less than 500, in order that I may communicate the same to the Board. The barrels would require to be turned at the nose, so as to fit one bayonet indiscriminately. They must be clear inside, but would not be objected to for trifling greys on the outsides, which may not, in my opinion, be injurious to the service. Upon consideration, I think the Board would not consent to the proposition of some of the barrel makers, that a few should be made by each before the price is decided upon. I will thank you to let me have your tender as early as possible. I am, Sir, your obedient servant, *Charles Manton.* To Mr. Joseph Turner." After this was received, at an interview with Mr. Manton, it was arranged as I have before stated.

3353. Mr. *Newdegate.*] He was the inspector of the Government, was he not?—He was the then inspector.

3354. Mr. *Muntz.*] There was some complaint made to the Committee the other day as to the double carbines that were ordered through Mr. Lancaster: did you hear his evidence?—Yes.

3355. He stated that the delay was the fault of the barrel makers?—Yes.

3356. Was that a correct statement?—No.

3357. What was the fact?—That order we received through Messrs. Lacey & Reynolds. One letter was put in at the time that Mr. Lancaster was examined, and the other is a letter from Mr. Lacey, wherein he requests the barrel makers to retain portions of the barrels, and to get them false breeched; that is a part of the work that belongs to the gun maker, and not to the barrel maker, and the delay principally arose from those barrels being detained in Birmingham to get them so false breeched for Mr. Lacey, and not for the want of being made as represented.

3358. Then it is all a pretence to say that the barrel-makers did not do their duty?—Entirely.

3359. It was stated that the want of one barrel-roller would stop the whole supply of arms; do you understand that to be the case?—So far as one individual contractor is concerned it would do so, as I have experienced myself, the Board of Ordnance having since this contract taken my roller from me.

3360. Colonel *Lindsay.*] How do you mean?—Mr. Gunner came down to Birmingham, and without any reference to me engaged the man, and set him to work at Enfield.

3361. Mr. *Muntz.*] Have any deputation from the Ordnance visited your manufactory?—No.

3362. You have been asked whether, in the event of the Board of Ordnance giving you large orders for barrels, you are prepared to make any alteration in the price?—As I before stated, an alteration in the pattern, by taking off the squares, alters the price in some degree at present; we could make some reduction afterwards, if we were met fairly in the view.

3363. How long have you made barrels for the Board of Ordnance?—Since 1839.

3364. You stated, did you not, that you had not been subjected to strikes much?—Only twice.

3365. Did they cause any permanent hinderance?—In 1842 we had something like six weeks' hinderance; and on the late occasion it has hindered us about three weeks.

3366. Being in the middle of the gun trade, have you ever heard whether the rejections that have taken place in other materials besides barrels, have been in the same vexatious manner and in the same proportion?—In the order of 1851, that I had myself and different makers, I found as nearly as possible the same average rejections in every material.

3367. Was there any alteration as to the view, with respect to those materials, the same as there was with regard to the barrels?—I am not aware of that.

3368. You are satisfied that your barrels are now being viewed fairly?—Yes, I have nothing to find fault with.

3369. You still think that you shall be able to finish your contract within the time?—Yes.

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3370. Mr. *Newdegate.*] You stated that you had heard and believed that the rejection of all the parts of the musket simultaneously increased and decreased with the rejection of the barrels; that is, that the quantity rejected of all the parts of the muskets was greater previously to the interview with the Board of Ordnance, at which you were present, and that it afterwards decreased?—I am not aware of the fact, only as concerns the barrels, of any alteration having taken place in the view after our interview with the Board of Ordnance.

3371. Have you heard that?—I have not.

3372. Lord *Seymour.*] You have stated that now your tools are in proper order for making the new pattern musket barrel?—Yes.

3373. Supposing your machinery to be all in good order, and supposing also that you had a barrel-roller ready and willing for it, what number of barrels do do you consider with your establishment you could make per month?—I could make, if I had a large supply to go on with, about 2,000 per month.

3374. When you say, if you had a large supply to go on with, what do you mean by that?—If I received an order for 20,000 or 30,000 at a time; I should be then enabled to move all my machinery, and to get a sufficient staff of hands to do that quantity. I could with ease do it with my present premises and machinery.

3375. Mr. *Muntz.*] You mean, do you not, that if you had a contract for 2,000 per month, you could do it?—Yes.

3376. From your knowledge of the trade as now carried on in Birmingham, the people employed in it, and the sort of skilled labour now applied to it, what number of guns in consecutive orders for this very same Minié Rifle do you think Birmingham could turn out safely per annum?—I do not know that I am sufficiently acquainted with the finishing department of the gun trade to give an answer directly.

3377. Mr. *Geach.*] How far can you give an answer as to barrels?—We could make 150,000 per year in Birmingham, the present contractors; which offer we have already made to the Board of Ordnance, if they will give us a contract extending over five years.

3378. Is it not the fact, that the general trade of Birmingham has been very good for the last two or three years?—The general trade has been very good indeed.

3379. Do you think that any of the merchants, who have given orders to the general manufacturers, have been more speedily served than you have served the Government with those guns?—I think that a line cannot be drawn in that particular. What is supplied to merchants generally is a very different description of arm.

3380. Have orders generally been supplied with punctuality?—I cannot say that.

3381. It is your interest, is it not, as well as your desire, to apply machinery, so far as it can be applied, to save labour?—Of course.

3382. If you saw a cheaper mode of producing a barrel by machinery, that barrel being equally good, you would apply machinery?—I should be very glad to do so in any case.

3383. Mr. *Monsell.*] You stated that the whole number of barrels for the artillery carbines were supplied by the barrel-makers in August?—They were finished in that month. I believe that there were some few, perhaps 12 or 14, barrels left behind.

3384. Do you know whether the rest of the materials for those artillery carbines were supplied at the same time?—I do not know whether they were.

3385. You do not know whether the locks were supplied?—No.

3386. You spoke of your establishment being capable of producing somewhere about 2,000 barrels per month?—Yes.

3387. Is it the fact that machinery is applied more to the making of the barrel than to any other part of the gun at Birmingham?—I am not aware exactly to what extent machinery is used to other parts of the gun, but I have understood that more machinery is applied to the barrel than to any other material that is made.

Jovis, 23° *die Martii*, 1854.

MEMBERS PRESENT.

Sir W. Molesworth.	Lord Seymour.
Mr. Muntz.	Mr. Monsell.
Colonel Boldero.	Lord Paget.
Mr. Newdegate.	Mr. G. Dundas.
Colonel Lindsay.	Colonel Dunne.
Mr. Geach.	

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Mr. *Charles Millward*, called in; and further Examined.

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3388. Mr. *Muntz.*] YOU stated yesterday that the present order will be furnished before the time specified in the contract?—Yes.

3389. How long will it be before the whole will have passed through the first process of manufacture?—In three weeks from this time the whole of the barrels will be rolled; and in a month from this time the whole will be rough-bored; those are the two first processes.

3390. You feel, no doubt, that you shall be able to complete them in time?—I have no doubt that I shall be able to complete them before the time specified.

3391. When you have completed them, what shall you set the men to do who are now employed upon that work?—Those men who are engaged in the manufacture in rolling and boring, while the other portion of the order has to be completed, must turn to other things, to private trade; the general work of the trade.

3392. By which means you will sustain a considerable loss; you must alter the position of the tools?—Yes.

3393. And if you receive Government orders afterwards, you must alter the machinery again?—We must alter it back.

3394. Does the want of successive Government orders diminish your capability of producing a large quantity?—Yes, certainly; all those circumstances cause delays.

3395. It has had that effect for the last two years, has it not?—Yes; since the supply stopped in 1848 or 1849.

3396. Every time that you had a contract, when one portion of the work was done, the workmen who had been employed upon that work were obliged to stand still or shift to other work, for the want of a constant succession of labour?—Yes.

3397. A statement has been made by Mr. Lovell with regard to the cost and the profit upon gun barrel making, which appears to me to be erroneous, and I am desirous of obtaining your opinion about it. Just refer to page 7 of the Appendix, and read the statement there?—"The cost at Enfield for labour and materials in boring, turning, and finishing the new line musket barrel from the black is 4 *s.* 6 *d.*, which, deducted from 12 *s.* (the contract price that is paid to the trade for the finished barrel), would leave 7 *s.* 6 *d.*; then, if we allow from this the sum of 2 *s.* 9 *d.*, which I estimate the cost of the barrel to be in the black state, viz., 11 lbs. of iron at 3 *d.*, there remains the sum of 4 *s.* 9 *d.* to the master, for interest on his capital, for time, trouble, and contingencies. All this would show, I think, that here also it may be reasonably expected a reduction would be brought about by the action of free competition."

3398. What is your opinion as to that calculation?—In the first place he says, "The boring, turning, and finishing the new line musket barrel from the black is 4 *s.* 6 *d.*;" there is nothing allowed for the wear and tear of the machinery, or for power, it being merely the price given to the men employed in doing those things. Then, if we allow from this 7 *s.* 6 *d.*, 2 *s.* 9 *d.*, as stated here, which

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is estimated as the cost of a black barrel, in the next line it states 11 lbs. of iron at 3*d.*, which comes precisely to the money as stated here for a black barrel, namely, 2*s.* 9*d.*, there remains the sum of 4*s.* 9*d.* Now, out of this sum of 4*s.* 9*d.*, we shall have to pay for the welding of the barrel, the rolling, the coals, the expense of the furnaces, the power to drive the machinery, which we term the making-up, and the ends of the barrel, the lumping, and the material to lump them with.

3399. What would that amount to, in your opinion, per barrel?—That in itself would amount to 14*d.* or 15*d.*, perhaps, with the labour upon it.

3400. In your opinion Mr. Lovell has made the cost of the barrel 15*d.* less than it is?—He has evidently made great mistakes; he has charged the barrel 2*s.* 9*d.* in black, and afterwards says that 11 lbs. of iron come to 2*s.* 9*d.*; he cannot call a bar of iron a black barrel.

3401. How much coal do you use per day in your furnace for rolling barrels?—For each furnace, we use about two tons a day.

3402. What is the quality and the cost of that coal?—The coals that we now use are what are called lumps, and they cost us 13*s.* a ton delivered.

3403. What do you consider the amount per barrel that it costs you in coal?—About 4*d.* per barrel for one furnace.

3404. Mr. *Monsell.*] Supposing your machinery to be working up to its highest point?—That is the highest point that we could work for that particular purpose with one pair of rollers, and one furnace.

3405. Lord *Seymour.*] You stated yesterday, did you not, that in conjunction with other barrel contractors of Birmingham, you had offered to make for the Government, at the rate of 150,000 a year, if they would give you a contract for five years. Will you state at what price you would offer to supply those barrels?—The price was not stated.

3406. What was the object of making an offer to the Government, in which no mention was made of price?—We understood that this manufactory was thought of in consequence of the incapability of the trade to supply arms, and we put out that document, stating that such capability existed on the part of the barrel-makers.

3407. You have stated that you could yourself supply at the rate of 2,000 barrels a month?—Yes.

3408. Now, for that purpose how many men should you require to employ?—I should say, at a rough calculation, from 70 to 80 men in all stages.

3409. And it would take the whole of the power that you could use with your present works?—Of that quality of work entirely.

3410. If you were required to make at the rate of 3,000 barrels per week, what sized works, as compared with yours, would be able to accomplish such a task?—Confined to that trade alone, I can scarcely give an answer to the question. We do not entirely depend upon the Government; we are obliged to have some trade in case the supply ceases. Confined to that article, I can scarcely give an answer to the question in any way correct.

3411. *Chairman,*] At what price per barrel could you furnish 2,000 barrels per month?—If we had them for a length of time, I could furnish them at the price of 10*s.* 6*d.* each; but I must observe at the same time, that already an alteration has been made in the pattern of the barrel, which reduces the price of the barrel 1*s.* 6*d.* in labour, which is taking the square from the breech end, as originally made.

3412. Mr. *Monsell.*] Could you state at what price you and the other barrel makers, at Birmingham, could supply 150,000 a year for five years?—Ten shillings and sixpence each.

3413. Can you state generally how many barrels you have made in the course of the last three years?—Very few.

3414. I do not mean for the Government, but how many have you made altogether?—We make upon the average 1,000 a week of common barrels.

3415. How many, on the average, have you made a week for the Government during the last three years?—We have had no orders for the Government, except the 3,000, which was a portion of the 1851 order, and the 385 carbines, which was an artillery order, and a few other little orders, such as pistols; nothing worth mentioning, except the present order, for the last three years.

3416. Therefore,

3416. Therefore, the greater portion of your time has been occupied by the orders of other persons?—Yes, the greater portion of the last three years has been so occupied.

3417. Do you consider that the Government demand for muskets, in Birmingham, forms a large portion of the demands on the gun trade of Birmingham?—Not a large portion.

3418. Mr. *Newdegate.*] If you had not a demand from other quarters, should you be able to supply the Government at the price that you have named?—Certainly not, if we were entirely dependent upon the Government for work.

3419. You mentioned that there had been a great difference made in the pattern, by taking the square of the barrel?—Yes.

3420. By that you mean that the first pattern was square towards the breech, and that it was subsequently altered to a circular form?—Yes.

3421. In an answer that you gave yesterday, you stated that a roller, who was one of your workmen, was taken from you and employed at Enfield?—Yes; such is the fact.

3422. Was that on account of his being skilful?—I apprehend so, as he is the only one that the Government employ.

3423. Do you consider that the loss of his services is a loss to you?—Yes.

3424. Was any proposal for his removal made to you?—None.

3425. He was removed, without notice, at once to Enfield?—Yes.

3426. Do you think, if the view had been fair, that any complaint would have existed with regard to the supply of the barrels?—I do not think there would.

3427. Has there been a difference lately in the view?—Yes.

3428. If the view had been as it has been recently, what would have been the state of things?—A great difference would have been made in the supply.

3429. It would not have been delayed as it has been?—No.

3430. Mr. *Monsell.*] What do you mean by recently?—Within the last fortnight.

3431. Mr. *Newdegate.*] Since the appointment of Mr. Gunner?—Yes.

3432. Mr. *Muntz.*] Did you ever see the written instructions?—Never.

3433. You can only speak of them by report?—No. In my communication with the viewers, when I have complained of the severity of the inspection, and I have made a remark in this way: "In your knowledge you know that this is as serviceable as any article that you have taken;" they have said, "I cannot take it, I must act up to instructions." From that I presumed that they had instructions that were very severe.

3434. You mean written instructions?—Yes.

3435. They were in force at that time?—Yes.

3436. Mr. *Newdegate.*] About when was that?—It was during the Minié rifle order of 1851, more particularly than any other time.

3437. You had been employed in the same business, in supplying the Ordnance previously to the opening of those contracts, had you not?—Yes.

3438. You have had considerable experience of the difficulties of the supply, if there are any, and of your own powers of supply?—Yes.

3439. What you have stated as to the view is the result of your experience, not only in recent times, but under previous conditions of the view?—Exactly so.

3440. Mr. *Dundas.*] Have you ever suffered much inconvenience, or any inconvenience from strikes amongst your workmen?—Never but twice, since I have done business with the Board of Ordnance; once in 1842, and again last January.

3441. After having been for some time without a contract, or without being called upon to furnish barrels to the Government, have you employed your men in making an inferior article for the trade?—We make articles for fowling pieces as well; and all the skilled workmen that work at the Government work that we can possibly retain, with the power we have, we place on the bettermost sort of work, merely to retain them till we want them again.

3442. Have you never experienced any difficulty in bringing your men back to that superior work, after having been without a contract for some time?—Not the few, but the many; to get over a considerable quantity of work, we have had very great difficulty.

Mr. *John Dent Goodman*, called in; and Examined.

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3443. Mr. *Muntz.*] YOU are a Merchant transacting business between Birmingham and America, are you not?—Yes.

3444. You are also connected with the gun trade?—Yes, I am a partner in a gun manufactory, in which I do not take any active part; not any practical part beyond the general supervision of the business.

3445. You are not the manager of the manufactory?—No.

3446. You have been in the habit, have you not, for many years of exporting goods of all kinds to America?—Yes.

3447. And among others a large quantity of guns?—Yes.

3448. It has been stated to this Committee, that the gun trade in Birmingham has got into such a miserable state of inefficiency that it has been falling off considerably; what is your opinion upon that?—My experience of it is quite the reverse of that. The trade in guns has very materially increased during the last few years, and is still steadily increasing.

3449. You have been in the United States, have you not?—Yes, I was in the United States last year.

3450. When there, did you hear whether there were any manufactories of guns in the United States?—I directed my inquiries very particularly to that point, but I could not find that there were any manufactories which in any way came in competition with the guns which we export from this country. The Americans make guns of a peculiar class; their own American rifles they make exclusively themselves; we do not touch that manufacture at all, and therefore there are several manufactories of that article; but for those we supply a great portion of the materials. We supply, I should think, all the locks that are used in the United States for those rifles; all the locks, I think, are imported from Birmingham, and the barrels are made in America.

3451. Is it not the practice with the American gun makers to have their locks imported from Birmingham, and to have their own names stamped upon them?—That is a very common and daily practice. I have a lock in my pocket now which was sent from Birmingham, which bears the stamp of an American manufacturer.

3452. Will you produce it to the Committee?—Yes (*producing the same*). This lock is stamped "Griffith, Louisville, Kentucky." If that lock was not made in Birmingham, that is the pattern from which a great number has been made.

3453. Do they make any of these kind of locks in America?—Some years ago they attempted to do so by substituting cast-iron plates.

3454. With the view of making them cheap?—Yes; that is to say, to make them so cheap as to enable them to compete with our Birmingham article, but it was an entire failure. The cast-iron was not applicable for the purpose, and they now, I believe, supply themselves entirely from Birmingham.

3455. What is this screw under the cock here (*pointing to the lock*)?—That is a plug. It is a simple but a very clumsy process of communicating between the nipple and the barrel, and it is done by them for cheapness, because the percussioning of the gun, which is generally done at Birmingham, requires a great deal of labour, and they get over that by the clumsy process of using that plug.

3456. Is not this also used for altering the common flint gun into percussion?—Yes.

3457. You say they did not succeed in making their locks of cast-iron?—No; I judge so, because our demand has increased since that time.

3458. Do you sell large quantities of those locks to the American rifle makers?—No; we do not sell them to them, we sell them to the importers; they reach the American rifle makers, eventually.

3459. They do not make their own locks for their own rifles?—No.

3460. That you are confident of?—I can give this fact in confirmation of it; when I was in Philadelphia, a Cincinnati correspondent of ours was there, and he came to me and told me that an American manufacturer had offered him that morning 100 dozen of locks at a given price, and he asked me if I would accept the price at an equivalent price in English currency, and I said no, because it was a lower price than the English article could be produced at; and in the

next

next place, I would not fix any price at all. He did not give me an order, but after he was gone, I went and sought the other manufacturer, from whom he alleged that he had received that price, and I found him out to be a man from Darlaston, near Birmingham, a gun lock manufacturer, who had gone over to America some years ago; and he told me that for the first four or five years he could find no employment in his trade; that such work was not wanted, and he had had very hard work to live: he told me fully all that I wanted to know about the offer he had been making that morning to our correspondent. I asked him how he produced the locks, and I soon ascertained that he had not offered to make them at the price at which they were wanted from me; and he stated that he did not make the locks himself, but he imported them from England in a filed state, and as his trade was that of a polisher, he polished them himself in Philadelphia. That is a very small part of the manufacture of the lock, but that was all that he did; in fact, he would have bought the locks from the very same manufacturer in Darlaston from whom we should have bought them.

3461. In fact, they would have been English locks?—Yes.

3462. You are an exporter of a large number of guns to America annually, are you not?—Yes.

3463. What kind of guns are they?—I have drawn out a statement here to show the prices of the guns, and it will show the character of the guns that we sell; I took a given number of months in last year, and I extracted all the guns that we had sold during that time, and the number was a little over 4,000 during the period that I name.

3464. In a year?—No, I do not say the time. I do not wish to mention how many guns we sold in a year. It is merely to show the number of guns sold during a period, that is all; therefore it is a fair statement of the general run of the quality which we do sell. I have taken the price from the lowest to the highest. I have here every price, and taking the single guns we sold under 10*s.*, 463; between 10*s.* and 20*s.*, 559; between 21*s.* and 30*s.* *nil;* between 31*s.* and 40*s.*, 14; between 41*s.* and 50*s.*, 3 guns. Those are all single guns, beyond that price we have not sold any. With regard to double guns, we begin at 21*s.*, and from 21*s.* to 30*s.*, the number was 1,841; from 31*s.* to 40*s.*, 638; from 41*s.* to 50*s.*, 280; from 51*s.* to 60*s.*, 113; from 61*s.* to 70*s.*, 59; from 72*s.* to 80*s.*, 36; from 81*s.* to 90*s.*, 28: from 91*s.* to 100*s.*, 22; from 100*s.* to 150*s.*, 36; and above 200*s.*, 4; the highest price of the guns sold is 18*l.*

3465. Those were guns sold by your house in a period?—During a given period.

3466. Do you know how many more houses there are in Birmingham that export guns to the United States?—I do not know the number; speaking off-hand, there may be eight or ten more houses.

3467. Those are what we call some low, and some middle-priced guns?—Yes.

3468. Do you happen to know, of your own knowledge, whether the men who work at those guns for you are competent to perform Government work?—A great many, no doubt are, particularly those who make the best-priced guns; it is not very frequent that the same men who make fowling-pieces do make muskets.

3469. Have you any men in your employ now who have worked at Tower work?—Yes, certainly we have; the principal part of our trade as gun-makers is the manufacture of common muskets, the commonest description of muskets, that are used for the African trade. It must be quite understood that they are not at all the same article as the military Government musket, the price will show that at once; at the present time the price is about 10*s.* each, and that will show of what class the article is. We make those on a large scale, and we employ several Tower workmen, although they are men who are skilled and able to produce much better work; but we hear from them that they are so annoyed by the uncertainty attending Government work, being sometimes employed and sometimes not, that we have several who given up the Government to take to making this common work of ours, because they can get regular, steady, and certain employ, which they cannot get from the Government.

3470. Though they would appear to gain an advantage by being employed on Government work, they prefer working at this common work in consequence of the vexatious and irregular principles upon which the Government work is conducted?—Yes; no doubt they can get a better living by sacrificing their high skill.

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3471. What quantity of those common guns do you make?—I have a return of the number of guns which we made last year. I am now speaking as a manufacturer. This is a weekly return of the guns made during the year 1853; the total is 45,526.

3472. You made that number in your own manufactory?—Yes; when I say that we made them in our own manufactory, we employed a great many out-workers, but they were our own people.

3473. Were they made in regular quantities?—The first week was the week after Christmas, 93; the second, 759; 638, 536, 715, 800, 779, 852, 510, 834, 631, 1,007, 1,023, 495, 913. Towards the end of the year the make is larger: 1,019, 1,049, 1,227, 1,169, 1,148, 1,546, 1,511, 1,315; then comes the week before Christmas, when the men make a push, 1,755.

3474. You find no difficulty in obtaining the regular supply of work that you want?—No difficulty whatever; we are obliged to be very punctual in our deliveries. The orders are given by merchants for certain ships sailing on a certain day, and if the guns are not ready they are no use to them, great disappointment ensues, and the guns would be returned to us.

3475. Some of your men worked formerly at the Tower, you say?—Yes.

3476. In exporting those various sorts of guns to America, what duty do you pay for introducing them?—The duty is 30 per cent., but that is not all the protection the American manufacturer enjoys; we estimate that the expense of importing guns amounts to 65 per cent.; that is the calculation that is always made.

3477. That of course must be added to the charge that you make for the gun in the first instance, and before it can be sold in America?—Those charges consist of 65 per cent.; I will mention them: the first is the packing-case and carriage to Liverpool, cartage to the docks, dock dues, town dues, shippers' commission, bill of lading, freight to America, insurance, duties, landing charges, storage, the receiver's commission, expenses attending the remittance, the bill of exchange, loss of interest, first in the passage of the goods, next in the passage of the bill, and lastly in the currency of the bill.

3478. You estimate these at 65 per cent.?—Yes, with the duty.

3479. There used to be a gun imported to North America, called the North-west guns, for the Indians; do you make any of them?—Yes; the American Government supply annually a number of North-west guns to the Indians, and the late American Government purchased them from a Philadelphia manufacturer; they purchased them from him, because they were resolved to support their own manufacturers regardless of the cost, but when this present Government came into power, they determined to throw it open to competition, and would no longer confine it to their own manufacturers, and a Baltimore house applied to a merchant in Birmingham for a pattern, and that pattern was made at my manufactory. It was sent out to America, and was examined there by the Government buyer, and was pronounced to be a cheaper and better article than the one that had been hitherto supplied by the Philadelphia manufacturer, and it was resolved to give the order to this importer of guns. Immediately afterwards that importer died, and consequently the order fell to the ground, and it went, as before, to the Philadelphia manufacturer.

3480. Where does he get his materials?—I visited that manufactory, when I was there, and saw the guns that he was making, and he buys all his locks from Birmingham; we ourselves supply him with some of them; he buys a great deal of his furniture from Birmingham, not all. The barrel, I believe, he makes or procures somewhere in America; but when I was in his store, he showed me a number of guns that he had made, and he said that they were made (those were not North-west guns) from the American Government's rejected barrels; every year they dispose of a great number of barrels, and indeed of muskets too, I believe; they are bought by the gun makers in America, and by them are worked up into a low priced gun. I think he said that the price of the gun was about six or seven dollars; it was a very rough gun, made with such a lock as I have placed before the Committee just now.

3481. The price was about 25 *s.*?—Yes, thereabout; it is a very rough article, because it must necessarily be so with the lock which we send out to them; we send out locks to America in the state that the Committee sees this; it is hardened and hard coloured brown outside, therefore the file cannot touch that lock after it is put in the gun; and on that account it is impossible that the fitting of this lock

lock into the gun can be anything like workmanship. It is necessary after the lock is put into the stock, that it should be filed over, and all made smooth together, but they cannot do that with this lock; it must stand as it is here; they cannot disturb the lock; the file will not touch the plate.

3482. Mr. *Dundas.*] How is the defect in this lock obviated; there is no half cock in it?—It is not intended to have any half cock; there is no chance of its catching in the second bent; they are all made in this way.

3483. Mr. *Muntz.*] Do the Americans prefer them that way?—Yes.

3484. Mr. *Dundas.*] You spoke of making guns for the North-west trade, that is, for the Hudson Bay Company, is it not?—The American Government supply goes to the North-west Company, the supply to the Hudson's Bay Company goes from this country. The Hudson's Bay Company in London purchase their guns in this country.

3485. Mr. *Muntz.*] What did you understand by there being barrels rejected by the American Government; what were they rejected for?—I am not quite in a position to answer that question. I do not think they are barrels that are rejected for being defective. Every year the Government get rid of their old stores, and they are barrels that have been received, and probably intended to be used, or they may have been used; but every year they dispose of a quantity, so as not to accumulate old stores.

3486. Do you make pistols in your manufactory?—Yes; that is a leading branch of our manufacture.

3487. What sort of pistols do you make?—We made a great many revolving pistols during the Australian years, as we call them, 1852 and 1853.

3488. What sort of revolvers are they; are they like Colonel Colt's?—They are six-barrelled pistols, very different in pattern to Colonel Colt's, and of different construction.

3489. They are revolvers?—Yes.

3490. Are they efficient revolvers; do they revolve quickly?—Yes.

3491. Do you make them by machinery?—Yes; throughout as far as machinery can be possibly applied to such work, just as much as Colonel Colt does.

3492. You use machinery so far as it is advantageous to do so?—Yes.

3493. At what price do you make them?—The price is low enough now, but we can get a very good profit and sell them at 12*s.* a piece.

3494. Six-barrelled revolvers?—Yes.

3495. And good serviceable pistols?—Yes, good sound pistols, because every part is made by machinery; they are all sound; there is no high finish about them.

3496. Are they fitted so as to be durable?—Perfectly durable.

3497. Do they shoot as well as Colonel Colt's?—I have no doubt they do.

3498. Colonel *Lindsay.*] Do they last as long?—I have no doubt of it; the parts are made of good materials, and where steel should be used it is used.

3499. Mr. *Muntz.*] From your knowledge of the gun trade, do you think that any person who was not a perfect gun-maker, who bought one of Colonel Colt's pistols and one of yours, could tell which was the better?—I should not like to put one of those that I speak of at 12*s.* by the side of Colonel Colt's. So far as appearance goes, you would at once detect the difference, but, so far as efficiency goes, one would shoot as well as the other; so far as finish goes, I should not name the two together; the engraving, the colour, and the polish of the stock are different.

3500. Is yours a pistol that is in large demand in Australia?—Yes; it was during the years that I speak of.

3501. *Chairman.*] What is the price of the highest priced revolver?—About 60*s.*, I should say.

3502. Mr. *Muntz.*] Have you ever seen any of Colonel Colt's pistols?—I have had a few in my hand.

3503. Are you able to speak with regard to the work in them?—It never struck me as anything particular. I should say that it is very inferior to what can be produced, and is produced, in Birmingham.

3504. Have you ever examined one of the Government Minié rifles?—Yes.

3505. Can you speak as to the quality of the work in them?—I think I had better not give an answer. I possess a mercantile knowledge of these matters,

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but beyond that I do not profess to know. When an article is put before me, I know enough of it to be able to purchase it.

3506. Can you form an idea, from your mercantile knowledge, of the number of guns that it would be possible to make in Birmingham per annum?—I should hardly be able to give an opinion. I have no doubt that the quantity might be soon increased to any extent that was required; I am quite sure of that. We saw that at the time that I speak of, when so many pistols were wanted for Australia; that was an entirely new demand. Ten years ago there were no such pistols wanted in Birmingham at all; but when we found the pressure of the demand, we employed a number of workmen from other trades; we took on a number of brass founders in particular, and we found that those men well skilled in the use of the file made quite as good pistol-makers as those who had been brought up in the business.

3507. How long does it take to make a pistol-filer of a workman accustomed to brass foundry?—Three or four weeks.

3508. From your position, you must be very well acquainted with the nature of all the Birmingham trades; can you express an opinion as to how far the general workmen in the various Birmingham hardware trades are competent to be made into gun-makers?—I should say that out of the vast number of trades you might find many whom you could turn into gun-makers very soon.

3509. Would they be sufficiently skilled to work at any gun?—Yes; in 1848, when there was a great pressure for muskets, we employed carpenters as stockers, and very good stockers they made.

3510. Are there many gun-makers at Birmingham besides you?—Yes.

3511. You stated that you made 45,000 muskets per annum?—Yes.

3512. Do you know how many other gun-makers there are?—I cannot say; there are not many who get up this African work, the common musket.

3513. Do they make the general musket?—Yes.

3514. In fact, they make any arms that are required?—Yes.

3515. You do not know what the total amount is that they make?—No, I have no data at all; I think it is a pity that through the proof-house some such data are not obtained.

3516. Do you know how many guns were proved at the Birmingham proof-house last year?—No, I do not; there is no return published.

3517. Colonel *Dunne.*] You stated that the greater part of the guns sold in America were sold at low prices, 10 *s.*, and so on?—The great bulk of the guns will be found to be between 20 *s.* and 50 *s.*

3518. In those prices from 10 *s.* to 50 *s.*, is the 65 per cent. for duty and other charges included?—No, it is exclusive; the price that I quoted is the price of the gun.

3519. When it is made?—It is the price in Birmingham.

3520. They are not sold in America at that price, are they?—No.

3521. Are not those muskets that you make for 10 *s.* very dangerous to the persons who fire them?—It is the fault of the proof-house if they are; I should say that they are almost the safest that go out of the town; they are never touched after the proof.

3522. Therefore they are as good as any other barrels, except that they are not so highly finished?—Yes, quite so; they are left in all their strength.

3523. Your own house exported 4,000 muskets in the course of last year?—Yes.

3524. You have stated that many of the workmen that you employ have left the Government on account of the vexations which they experienced, to go to the inferior work which you supply them with?—Yes.

3525. Do you think that it would be any injury to the trade if the Government put an end to those vexations, by withdrawing the trade from Birmingham, and manufacturing the arms themselves?—It would be the withdrawal of a very important branch of trade there is no doubt; it would not injure us in particular, further than it would drive several gun-makers into our trade.

3526. If the workmen find it an advantage to go to this rough kind of work, instead of being employed at Government work, what injury can they suffer by the Government adopting the manufacture themselves?—There would be a large number of those that are now working at the Tower work thrown upon the common work, and they would depreciate the wages of all those employed at the common trade.

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3527. If a very large contract were given now, say for 25,000 stand of arms, to the Birmingham trade, would not the persons taking those contracts be obliged to get many workmen from you to enable them to complete that contract?—I should say that those we employ would remain with us, and they would look for their workmen from amongst those who are now unemployed. Those men that we employ would not go to Government work, I think.

3528. Is there such a number of workmen at Birmingham that they would be able to turn their hands, at any moment, to a large contract, in addition to what you and other manufacturers might require?—Yes.

3529. Therefore they must be employed at this moment?—Yes.

3530. Have you any idea of the entire number of artificers employed at Birmingham?—I have no means of arriving at that.

3531. Then how can you say that there are so many men employed that there would be a sufficient number to get up the work?—I cannot lay down definitely a statement to that effect; I only know generally from rumour.

3532. Are you at all acquainted with the proceedings in relation to the Government contracts?—I have never had anything to do with them.

3533. Are you aware that in no case, for some years, has a contract been fulfilled to the day in Birmingham?—I have never had anything to do with them.

3534. What are the vexations which you understand the workmen are exposed to?—The want of employ and the uncertainty of obtaining employment regularly. The men are sometimes hard pressed for work, to bring in the work, and at another time they have nothing to do.

3535. Do you not think that if the Government were to give a large contract now, it would prevent the making of that large quantity of arms which are required for exportation?—I am not afraid of that: we have not yet had any difficulty in producing the guns that we require; never since I have been in the trade have we experienced any difficulty; orders have been regular, our men know what they can depend upon, and we have always been able to produce what we engaged to produce.

3536. Is not that the reason the contractors for the Government have not been able to fulfil their contracts?—Had we taken men on irregularly, and at one time in large numbers, then it might be said that the Government was pressed by our taking the men away from them, but that is not the case. Our make is perfectly regular, therefore the Government know what they have to depend upon. In the work that they require they never can be deceived by our proceedings; we never come upon the trade too heavily at one time, and not at another.

3537. I do not say that you have failed in producing the work that you wanted to export, but that from the employment you give, and the inducements that you hold out, and the vexations which you say the Government causes to the trade, the contractors are unable to obtain workmen to perform their contracts?—If our trade offered greater inducement to them than the Government trade, our taking the men of course would throw an impediment in the way of the Government.

3538. Mr. *Muntz.*] Do not you think that instead of the Government taking the trade away with the view of benefiting Birmingham, it would be better if they had a reasonable view, and a well-conducted establishment there?—No doubt; and they could produce the work with the same regularity and precision that we do.

3539. Do you know that very frequently men who have been employed at the Government work, have had to stand still 15 or 18 weeks together without work, in consequence of the irregularity of the demand?—I frequently hear complaints from the men that sometimes they have nothing to do and are starving, because the Government contracts are so dilatory.

3540. Are you aware that the men have made a representation to the Board of Ordnance within the last six months?—No, I do not know that.

3541. It was stated to this Committee some time ago, that the export pistol trade of this country had been only regenerated or improved by the introduction of machinery by Colonel Colt for making pistols. Are you of that opinion?—I do not think that Colonel Colt's machinery has had the least effect at all; I am quite sure that in Birmingham they will never follow in Colonel Colt's steps in establishing a large and an expensive manufactory, and in putting down a great

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deal of expensive machinery; they could not, if they did, produce so economically.

3542. Colonel *Dunne.*] You state that the irregularity of the contracts from the Government is one of the causes which makes the Government employ vexatious?—Yes.

3543. Do you think that it would be possible for any Government to be able to give contracts with such regularity as would satisfy the trade of a place, or that the nation would allow any Government to give such contracts?—I think so. It is not a point upon which my opinion is worth much, but I do not see why they should not.

3544. Do you think that when you have only 65,000 or 100,000 men in arms, you can go on making muskets, so as to give regular employment to the manufacturers at Birmingham?—The Government always keep a large amount of muskets in store, and they have a large quantity in excess of what they want, by that they can always regulate their demand, except in times of war; but in a general way they can regulate their demand, I should think, so as to have it as regular as ours.

3545. Are you aware that for many years before 1851 there was no Government contract at all?—I have never had anything to do with Government contracts.

3546. Mr. *Muntz.*] Supposing that you as a merchant wanted 100,000 stand of arms, should you order 20,000 stand of half a dozen manufacturers, and not issue any further orders till the whole of those contractors had executed each his individual order; or in other words, would you let all those who had completed their orders stand still waiting to start again, until one idle man had completed his?—Certainly not.

3547. Should you expect anything like a good supply under such circumstances?—No.

3548. Mr. *Geach.*] You have stated that you make some arms as low as 10*s.*, and others at higher prices—say 3*l.*; and you could judge by inspection of the value of an arm, that is, you would not give 60*s.* for a gun that ought to be sold at 50*s.*?—No.

3549. You would be able at once to see the difference in those guns, would you not?—In the fowling-piece trade, which comes more particularly under my notice, it is a part of my business.

3550. And in the other trade, the African trade?—There is no great difference there, not above 6*d.* or 1*s.* difference between the highest and the lowest; they are all made of one grade.

3551. You spoke as to the pistols that you make, that those low-priced pistols at 12*s.* are as good for shooting purposes and for wear and tear as the higher priced pistols at 60*s.*?—They are perfectly good and efficient weapons.

3552. And you stated that the only increase in the expense was in consequence of the greater finish given to the article?—Yes; the Honourable Member is aware that the increased finish of the arm does add to the efficiency of the weapon; but every part of our common pistol is sound and in good working order, and would work as well as a better finished pistol; they are good and serviceable articles.

3553. Does the extra expense really add to the efficiency of the pistol?—I do not think that there is much more fear of derangement in the common ones.

3554. There is a great difference with regard to the parts corroding from the better fitting of them in the one case; is that the reason of the extra expense?—The first quality pistol is filed by a man who is paid much higher wages.

3555. Can you state whether in your opinion there is any increase of efficiency between the price of 12*s.* and 60*s.* in proportion to the extra price that is paid?—No, not as compared with the extra price; a great part is expended in finish and ornament.

3556. You are in the gun trade largely, and have you not applied machinery wherever you found that the application of machinery would save labour, and produce the article equally as well?—Wherever we have found it work economically, we have done so.

3557. But in many cases hand labour is found to be less expensive than machinery, is it not?—Exactly; we cannot substitute machinery, because we can do it much cheaper by hand labour.

3558. Do you, as a merchant, believe that if you had an order for 50,000 stand of arms of any given pattern, you could procure them within a reasonable time in Birmingham?—No doubt of it; it could be done, and was done in 1848, when there was an immensely increased demand brought upon Birmingham all at once by foreign governments.

3559. Mr. *Newdegate.*] There was no difficulty in meeting that demand, was there?—No; a very largely increased quantity was sent from Birmingham during that year.

3560. Within that one year?—Yes; it was a very sudden demand; it came all at once.

3561. It was a demand of which you had had no previous notice; but it was met, and the Government were satisfied?—Yes.

3562. *Chairman.*] What was the increase in that year?—I do not think that there is any data to enable us to state that; the proof-house would give the best record.

3563. Mr. *Monsell.*] At what price were those muskets supplied?—In that year the value of the muskets was very much increased, in consequence of the suddenness of the demand; there was a great number of different qualities produced at the time. I should think that the leading gun was about 17 *s.* to 20 *s.*

3564. Mr. *Newdegate.*] Do you know what governments were supplied with those arms?—I should think that the Birmingham people were not in communication with the governments.

3565. Therefore you would not know into what countries they went?—No.

3566. You have stated, with reference to the transaction at Baltimore, where you lost the order by the death of your correspondent, that your guns being new guns would, in that case, have come into competition with guns made up of the America Government's old stores, you paying 65 per cent. the expense of exportation, and that you competed successfully?—No, I did not say that our North-west guns would come in competition with the American guns, made of the American Government's barrels; but the North-west guns they would have made, they would have made on purpose for that order; the barrels rejected by the Government are not such as are suited for the North-west gun; it is a light barrel and smaller than the Government barrel; they would have had to make those barrels.

3567. When you cited the use of the barrels, which had been sold as old stores of the American Government, did you mean the Committee to infer that there was any competition in that class of gun with the export from this country?—No, none whatever; we did not attempt to make a gun to compete with that.

3568. Then are the Committee to understand, that the Government did not make what might be called a trade profit on the sale of those guns?—They met with a heavy loss.

3569. There is a rejection of barrels of that sort every year by the American Government, is there not?—Yes; some time ago, I was asked whether I would buy a quantity of muskets; one of our correspondents thought that he could send to this country a number of muskets that had been bought from the Government, and he offered them to me at two dollars a piece, and out of that price he would have made a profit.

3570. Is it the habit of the Government of the United States to sell off old stores at a great loss?—Yes.

3571. Have you ever seen one of the more recently manufactured Government rifles in America?—No.

3572. With respect to the men who were formerly employed on the Government work, and who are now with you, have they recently, or during the last year or two, come to you?—It is not a thing that I have heard of very lately: I think it is some year or two since that fact was mentioned to me by my partner of our having Tower men in our employ, and of their coming to us.

3573. Within the last four or five years?—I do not think that any fresh ones have come very recently.

3574. How long have those men been in your employ?—I cannot answer that question; I do not come in contact with the men.

3575. You spoke of it as being a generally notorious fact, that the conduct of the Ordnance business has been so vexatious as to drive the men out of that trade?—Yes.

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3576. Lord *Seymour.*] You stated that you supplied all the locks to the American gun-makers, or at least a great many of them?—Yes.

3577. Are those locks made by machinery?—No, they are not.

3578. No part of them?—I should think no part.

3579. With your knowledge of the gun trade generally, you do not think it advisable for the purpose of obtaining cheaper locks, to make them by machinery?—Machinery is employed in the manufacture of the same description of locks; that is to say, the parts are stamped, and some of the limbs of those locks may be stamped, but I am not a lock manufacturer, and I do not come in contact at all with the manufacture; I am simply a buyer; to me it is immaterial how they are made.

3580. You are not certain whether any of the parts may be made by machinery?—No; I can speak with certainty as to one part; I know that the cocks are stamped.

3581. You have stated that you believe, in the manufacture of pistols, in your establishment, you use as much machinery as Colonel Colt does?—We make all those parts by machinery that he makes by machinery.

3582. Have you ever seen Colonel Colt's machinery?—No; but we make the same parts by machinery that he makes, if I am rightly informed as to what he does.

3583. Though you make the different parts of a pistol by machinery, can you take promiscuously a part of one of your own pistols, and fit it into another?—Certainly not; I do not think that it is possible in any pistol.

3584. Even when made by machinery, you do not believe that a general interchange is possible?—No, certainly not; the parts are so small, that any minute difference would throw them out.

3585. Having found machinery of use for manufacturing pistols, you do not think it advisable to apply machinery for the making of muskets for the African trade?—There is no analogy whatever between the machinery employed for pistols, and for muskets; they are two as distinct trades as possible. Every part of each piece is entirely different: in the one case, in the pistol barrel, it is drilled out of a solid piece of iron, and there is nothing in the manufacture of a musket that is at all analogous to that.

3586. Mr. *Newdegate.*] You are speaking of revolving pistols, are you not?—Yes, only of those, because there are very few of any other description made now in Birmingham; the Germans take that trade.

3587. Lord *Seymour.*] You do not think that a larger employment of machinery in the manufacture of muskets would tend further to reduce their price?—The fact that machinery can be employed in the manufacture of pistols does not at all prove that it could be used also economically in the manufacture of muskets.

3588. It might be applied to the manufacture of the lock, for instance?—There is no doubt it might.

3589. You do not think that it would tend to cheapen it?—I think that it would tend to improve the quality of it; I think that locks would be more uniform, and they would be better.

3590. You visited America lately; did you then see the works at Springfield?—No.

3591. You stated that you visited a gun manufactory at Philadelphia?—I did.

3592. Was machinery used in that manufactory?—Not at all; so far from that, the man told me that he had very great difficulty in getting up what few guns he made. I was speaking of how he got up a few fowling-pieces for which he bought the materials from this country, and he said that he had great difficulty in getting them, because there was no subdivision of labour there as there is in Birmingham. His son was standing by and he said, "He is a very clever young man, and he makes a gun from the commencement, stocks it, finishes it, percussions it, and engraves it all himself." That was a strong proof to me that, though it can be done, it is not done economically there, because had he been able to get those several branches of labour done by different persons, he would not have employed his son to do the whole.

3593. As you have a general experience with regard to the gun trade, are you of opinion that the gun trade of this country is 50 years behind all other manufactures?—Certainly not; I should say that it has made very great advances during the last few years; that there is room for still further advance, I have not

not the least doubt; we see it now before us, and shall in the course of time make those improvements.

3594. Mr. *Newdegate.*] You mentioned the fact that the Germans carried on the common pistol trade?—Yes.

3595. Is their supply of that article of superior quality?—They make a very low priced article indeed, of which the Americans buy a great number; more particularly at a price which we cannot touch, even as low as three francs a pair.

3596. And what is their quality?—As bad as it can be; it is a worthless article altogether; still there are a great number exported to America every year from Liege.

3597. In your trade have you come into competition with the German gun-manufacturers?—Yes, that is the only competition that we hear of from America. I never recollect an instance of a correspondent alluding to the competition of American manufacturers, but frequently they tell us that we are beaten in certain prices by the Germans and Liege manufacturers.

3598. Your power of competition with those low prices rests upon the superiority of your quality?—We depend entirely upon our quality, and that is where we excel the Liege manufacturers; our guns are better than theirs at the same price; and the proof of that is, that we sell a large number at the same prices as the Germans do; but the German gun is more showy, and there is apparently in the gun more for the money than in the English gun, but the quality of the English gun enables it to hold its place in the market.

3599. And your trade instead of decreasing has increased of late years?—I think it would be pretty safe to say, that the export of guns to America has increased five-fold during the last 10 years.

3600. Mr. *Muntz.*] It has not fallen down to nothing?—No, certainly not.

3601. Mr. *Monsell.*] Has it increased in the last three years?—Yes, decidedly; and is increasing fast.

3602. Would you be so good as to state your reasons for believing that?—We have ourselves sold a great many more, and I know that other merchants are selling a great many more, and that the difficulty of getting a supply of guns of those qualities is increasing from the increased demand.

3603. How would you reconcile that opinion with the fact that the number of guns exported from the United Kingdom in 1851 was 247,236, and in 1853, 238,767?—I do not believe that you can arrive at any correct estimate as to what the exports are. I know myself that we ship large quantities of guns, and the Custom House authorities have no idea whatever of what number of guns we export.

3604. Would they be likely to fall into as great an error in 1851 as in 1853?—They had the same opportunities in 1853 as in 1851.

3605. They had not changed their system, had they?—No.

3606. You stated, did you not, that the demand for guns was very much increased in the year 1848?—Yes, for military guns.

3607. Do you know to what extent it was increased?—No, I have no means of knowing that.

3608. You stated, did you not, that the price of the arm that was supplied then, was something under 1*l.*?—Yes, a great number were. I have no means of knowing what the other manufacturers supplied them at.

3609. Was there any view of the materials as they were brought in?—No, the gun was viewed when completed.

3610. Was the price much increased?—It was.

3611. To what extent?—Probably 25 per cent.

3612. Do you think that a large demand, coming suddenly from the Government, would be likely to increase the price very much?—Any sudden demand would do so; it has naturally that effect in all trades, and at all times.

3613. Do you think that the higher the quality of the arm, the greater the increase would be?—I should think not; I think that in the higher qualities, the increase would not be in the same proportion.

3614. Why would it not be in the same proportion?—Because the labour would be sufficiently well repaid at the present prices.

3615. I speak not of a sporting gun, but of a military gun. Do not you conceive that there is a very much smaller number of people in Birmingham capable of making the Minié rifle, than there is of those capable of making the low-priced

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priced gun?—Of course there are more workmen capable of making the low-priced gun, than there are capable of making the Minié rifle.

3616. Therefore there would be fewer persons in Birmingham capable of supplying the demand for the high-priced gun than the low-priced gun?—Probably.

3617. Would it not then be likely that a demand for the high-priced gun would increase the price more than a demand for the low-priced gun?—If there was a steady increasing demand for the high-priced gun, there would be no difficulty in introducing fresh workmen into the trade, who would keep down that price. If you bring a sudden demand upon the trade, it would naturally increase the price.

3618. You now consider that it would, at a greater per-centage, increase the price of the high-priced gun, than of the low-priced gun?—No, I should say not.

3619. Can you state at what price the North-west guns were to be supplied by you?—I am not able to answer that question.

3620. About what price was it?—At 13 *s.* or 14 *s.*

3621. You stated, did you not, that all your knowledge as to the proceedings at the Government musket establishment at Birmingham were founded merely on hearsay?—I do not profess to know anything about it.

3622. How many workmen do you employ in your gun manufactory?—That is a question which it is very difficult to answer. I should say that in our manufactory we have about 100 men, but it is the out-workers that I have a difficulty in enumerating; we deal only with the heads of shops, and how many they employ we cannot tell.

3623. What proportion of those 100 men do you know are ever employed by the Government on the Government trade?—I cannot answer that question.

3624. Is it a large proportion?—No.

3625. You stated, did you not, that the American Government sold some of their old musket barrels at a loss; I presume that old stores are generally sold at a loss?—Yes.

3626. You stated that the Americans generally got their locks from this country; do you mean the American Government?—No; when I speak of that I mean merely fowling-piece locks.

3627. Colonel *Lindsay.*] You stated, in answer to a question by the Honourable Member for Birmingham, that the number of workmen in Birmingham to be employed at the gun trade could be increased upon an emergency, and that you could add largely to the numbers?—Yes.

3628. Do you mean, speaking generally, that if the trade should increase largely a great number of men could be added to the trade?—At any time.

3629. Are you aware, either from your own experience or from general information, that in the year 1851 the Government made a contract for 28,000 muskets?—I know nothing about Government contracts.

3630. From general information are you aware of that?—I have heard so.

3631. Then in 1851 you think if the Government had required a larger supply even than they did they would have been able to have obtained it from the Birmingham trade?—I have no doubt if they had set about it in the proper way it might have been got without any difficulty. I am sure if a merchant had had such an order, and sufficient time were given, he would have got it completed without any trouble.

3632. Supposing the Government had made a contract for 28,000, and that the necessities of the service required 20,000 more, could the Government have extended their contracts with the Birmingham trade so as to obtain those 20,000 in the same period of time?—I think it would have come upon Birmingham so suddenly to do it, at once to double the contract, that it could not be expected that Birmingham could do it.

3633. Therefore they would not have been able to obtain the necessary number of workmen?—They could not do it all at once.

3634. Supposing they had to do it in a year, could it have been done?—I should think without difficulty. I think that the quantity that the Honourable Member has named is nothing to Birmingham in a year.

3635. Are you aware that "in February 1851 the Board were desirous of obtaining a further number of muskets before the end of the then financial year, 31st March 1851, but were informed by the contractors that there were not workmen enough in the trade to enable them to increase the number they were under

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under engagement to supply"?—I must again say that I know nothing about Government contracts, and never took any part in communicating with the Government contractors whatever; all that I know about Government contracts has come to me through newspapers, or some general source of information.

3636. My question relates more to the providing workmen, rather than to the number which the Government wanted to obtain; has Birmingham the power of so increasing its area of production, that the muskets might be obtained?—I have stated generally, that there is a great power in Birmingham of expanding the number of workmen; beyond that I do not think I can give any opinion.

3637. You stated that the Government usually have a store?—Yes.

3638. Though you are not acquainted generally with Government arrangements, is it or not the fact, that since the introduction of the percussion musket, in 1839 and down to 1842, the Government have had a store?—I always supposed so; but I do not profess to know anything about it; I think I said that I supposed they had a store.

3639. Mr. *Muntz.*] You would expect if the Government were reasonably prudent, they would have a store?—I think they ought to have.

3640. I suppose you know that their store was burnt down?—Yes.

3641. Do you happen to know what number of guns Birmingham ever did make for Government per annum?—No.

3642. Did you ever hear that they made 50,000 a year for years together?—No.

3643. If Birmingham could make 50,000 a year with its then population, now that the number is doubled, they could very likely make more?—No doubt of it.

3644. You stated before, that the general trade of Birmingham may be very readily applied to the manufacture of guns, that is, that men may be drawn in small numbers from various trades, and so perform any amount of work that is required?—Yes; they must begin with the lower priced guns at first.

3645. If a man is a good workman, how long would it take him to make the first rate guns?—It would take a little longer; we make carpenters into stockers.

3646. You were connected with the mercantile trade before you were a gunmaker, were you not?—Yes, I had been connected with the American trade upwards of 20 years.

3647. When you received an order for guns, how did you order them, piecemeal, or did you order the gun entire?—We ordered the gun invariably.

3648. When you did that, the party that you bought it from was responsible for the condition of the gun, and you had it viewed?—Yes, when it came into our warehouse, it was examined when completed.

3649. Was it taken to pieces?—To a certain extent, it was taken to pieces.

3650. What is your opinion as to the comparative advisableness of ordering guns complete or in various parts?—I am sure that if we attempted to order the materials, and then gave them to parties to set them up, we should never get through the order; the delays would be increased manyfold.

3651. It is the usual practice with all merchants, is it not, to order their guns complete?—Yes.

3652. A pattern is given out for the quality?—Yes.

3653. That pattern being approved of, the guns are made up to that pattern?—Yes.

3654. You are of opinion, are you not, that that plan will produce a much larger number of guns than the present plan pursued by the Government?—There is no question about it.

3655. Colonel *Dunne.*] Would the guns be such as the Government could rely upon?—Of course you would not have the same perfection in every branch; you could not make quite so sure of that, I should say, but quite enough. When you view the gun as a complete gun you can quite satisfy yourself whether the gun is a sufficiently efficient weapon.

3656. Mr. *Muntz.*] If a gun is taken to pieces and viewed, each part separately after it has been made up, viewers being appointed for each of the materials so separated, why cannot the guns be just as well viewed as they are now?—If you strip the gun to pieces it could be.

3657. If the gun was viewed after being once made up, and any of the parts

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were found to be inferior or defective, there might be some little expense in renewing them, instead of having them viewed in the first instance?—Yes; the manufacturers would be doubly careful to put nothing into their guns but perfect work, for they would run increased risks of having them rejected.

3658. Why should not a gun so viewed be just as serviceable as the one that is now received?—It would be, no doubt of it.

3659. Colonel *Lindsay.*] Would it not require a double view, once under the notice of the person who takes the contract, and then afterwards by the Government itself, who has to receive it?—That would depend upon the contractor; I should think he would know his men; he would know to whom he gave the orders for materials, and he would stand by the result of the last view.

3660. If the Government takes a contract, is not the Government bound to ascertain that that contract has been properly performed, therefore must it not ascertain that the contractor who has taken a contract for the whole musket, has done his duty?—Would they not ascertain that if they viewed his gun as a finished piece?

3661. Would that be done without each article being taken to pieces and examined in the same way that the contractor himself must do in the case of his sub-contracts?—To ensure a perfect view the gun must be thoroughly stripped and examined in every part.

3662. Mr. *Monsell.*] At what price did you contract for those guns of which you spoke in answer to a question from the Honourable Member for Birmingham?—The guns which we sell as American merchants, we do not make ourselves; we buy them of the different gun-makers in the trade; the manufacture of fowling-pieces is not a part of our trade as gun-makers; we almost entirely, not quite, confine our manufacture to that of common muskets and revolving pistols, and one or two other things.

3663. You think that the proceedings taken by the Government would, if persisted in, place very great difficulties in the way of obtaining a very large number of guns in a year?—I judge so, because they have already produced difficulties.

3664. Supposing that those proceedings were considered to be essential to the goodness of the article, that would considerably modify your opinion, would it not, as to the probability of the Government obtaining a considerable number of guns from contractors in a year in Birmingham?—Yes; but I think they might follow out their present regulations, and do away with a great deal of the difficulty which now exists.

3665. Mr. *Dundas.*] You manufacture muskets for the African trade, do you not?—Yes.

3666. What price do you consider covers the stock of that musket, when finished?—I cannot say.

3667. Do you recollect the wood of which the stock is made?—It is beech.

3668. Have you experienced much inconvenience from the strikes among your workmen?—We have been remarkably free from trouble; I scarcely remember an instance in which a strike has interfered with the due delivery of our orders in the whole time that we have been in the trade. We have been very little interfered with, because our trade has been regular, and the men have known what to depend upon, and we have been very little troubled.

3669. Mr. *Muntz.*] The men have not been used vexatiously, I presume?—We have used them well.

3670. You have been asked whether a gun would not require two views under certain circumstances; I suppose you know what those views would be?—Yes; and that made me suggest that there would not be two views.

3671. But admitting that there are two views, would it form so large an item in the cost of manufacture to have two views?—No.

3672. What is it worth in a gun, twopence?—I cannot give an opinion upon that.

3673. Mr. *Geach.*] You buy all the general goods that are made in Birmingham; have you not found that for the last two years there has been a great and an extraordinary demand for goods, and have not you had much more difficulty in getting the work done because of that demand?—Yes.

3674. Not only has there been a difficulty in getting the goods themselves, but

but the manufacturer of the gun, for instance, has had a great difficulty in getting his iron and other materials?—No doubt of it.

3675. You buy a great many articles that are made, more or less, by machinery; do you find that you get those articles made by machinery faster than those articles that are dependent more upon hand labour?—There has been some pressure throughout all trades. There are some machine-made articles that we have greater difficulty in procuring than any others; one that is made wholly by machinery we have the greatest possible difficulty in, that is the article of wood screws, in which every process is conducted by machinery.

3676. In the article of wood screws, the amount of which made by machinery is larger than any other article, suppose there had been a slackness in the wood screw trade for some time, and suppose there had been the same slackness in the gun trade, and that all at once there came a sudden demand, would you, from the fact of the one being made by machinery to a greater extent than the other, find more difficulty in getting an increased sudden supply of guns than in getting an increased sudden supply of wood screws?—The difficulty would be the same in either case.

3677. The fact of machinery existing would by no means increase the facility of meeting a sudden demand?—Not at all; they would have to find men and women to work those machines, as we should have to find hand labour to make the guns.

3678. Mr. *Monsell.*] Supposing that your usual demand for wood screws was 20,000 a year, and supposing that you had machinery capable of producing 150,000 in one year, would not that machinery facilitate your supplying that sudden demand rapidly?—There is no doubt of that; but the Honourable Member is supposing there to be a state of things that never would exist on the part of reasonable men; they never would keep 130,000 *l.* worth of machinery that they knew would be generally idle; they would have to put an enormous price upon the wood screw to cover that.

3679. Mr. *Newdegate.*] With reference to the answer that you gave to the Honourable Member for Limerick, when he stated that the Government accounts show a falling off in the export of guns, will you state whether, as a general merchant, you are not aware that the system of declaration has been so relaxed of late years that the accounts rendered through the Board of Trade with respect to those mixed cargoes are not relied upon as a strict account of the quantities of the articles?—I am sure that the returns cannot be relied upon for the quantities. I do not know that there has been any change between the system of 1851 and the system of 1853; the same difficulties must have existed in 1851 as in 1853. In that Return are included all the guns exported. Now you will find that such a very vast proportion of the guns exported are those common-class African guns that I spoke of, and that trade is more uncertain than the American fowling-piece trade; and there might very readily be a large falling off in the African trade, while the American fowling-piece trade was going on steadily.

3680. When you spoke of the increase that you knew to have taken place, that was an increase principally in the export of a superior class of arms?—I spoke of the export of fowling-pieces to the United States, when I said that there has been a large and steadily increasing demand.

3681. Do the Board of Trade accounts afford no criterion of that increase?—I should say none whatever.

3682. Mr. *Monsell.*] How do you reconcile that with the fact that there were 37,399 muskets exported to the United States in 1851, and only 33,582 in 1853?—I can only repeat, that there is no reliance to be placed upon the exact number of guns, because there is no source from which they can ascertain the number in each case.

3683. Mr. *Newdegate.*] You mean that the system of declaration is so relaxed with respect to mixed cargoes, in which guns and muskets are generally exported, that the accounts form no fair criterion of the export?—The invariable rule in giving particulars for the entry of the guns is, to declare them as so many cases of guns, but we never give the number of guns in each case; and that number may vary from two to 20 guns. It is a very common thing to send out guns, packed, the best guns in mahogany cases; and there may be two, three, or four mahogany cases inside one shipping package. It is a very common thing

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to send out cases with 20 guns in them, and between those packages we make no distinction in our advice.

3684. Colonel *Lindsay.*] Are they delivered under one figure?—We simply state that the case contains guns; we do not state how many guns.

3685. Mr. *Monsell.*] Has the class of guns exported to America changed since 1851?—Not materially.

3686. Colonel *Boldero.*] There is a great discrepancy between the Government Return and your statements; is this the fact, that every musket barrel, every fowling-piece barrel, every weapon of any shape called a small arm, goes through the proof-house at Birmingham?—Yes, every barrel.

3687. Consequently it is to be presumed that they keep a correct account of every barrel they prove, without saying whether it is a musket or a fowling-piece, and therefore a correct return may be obtained?—Yes; when I stated that the demand from America had increased fivefold, I said within 10 years. I say now, that it must be five times as great as it was 10 years ago; the Return of 1851 and 1853 was compared. Any inquiries that may be made will show that Birmingham has been most actively employed in every department of trade for the last two or three years; there cannot have been any material increase in that time, because during the whole of that time we have been actively at work, and our manufacturers have been busily employed, and that will account for the close numbers that have been furnished.

3688. Mr. *Monsell.*] Does that observation apply as well to pistols as to guns?—The pistol trade is a very uncertain one. During the Australian demand there were great quantities exported.

3689. In what years was that demand?—In 1852 and 1853.

3690. Colonel *Boldero.*] Do pistol barrels go through the proof-house?—They do.

Mr. *Henry Vanwart,* called in; and Examined.

Mr. *H. Vanwart.*

3691. Mr. *Muntz.*] YOU are a Merchant trading between Birmingham and the United States, are you not?—Yes.

3692. You are a native of the United States?—I am.

3693. How long have you resided in Birmingham?—About 50 years.

3694. During that time have you carried on a very extensive trade between Birmingham and its neighbourhood and the United States?—Yes, a very considerable trade; I do not know that it is the most extensive trade. There are many other merchants in Birmingham who have a large trade also.

3695. During that time you have been in the constant habit of exporting guns of all descriptions to the United States, have you not?—Yes.

3696. And materials?—Yes.

3697. Barrels, locks, and everything but stocks?—Yes.

3698. You do send a great many guns that are unstocked, do you not?—Very rarely, I send bayonets, ramrods, locks, barrels, and parts of locks.

3699. As you have heard Mr. Goodman's evidence, I will just ask you whether you subscribe to a large portion of it?—I do.

3700. Do you agree with him as respects the duty and the expenses of importing fire-arms into America?—Yes, I think it is very nearly correct.

3701. Do you agree with him as to there being no fire-arms made in America, besides rifles?—No; there are a few fowling-pieces made there; but muskets are made in large quantity.

3702. Not to any extent?—No; but few fowling guns.

3703. Have you been in the Government manufactory at Springfield?—No.

3704. Have you seen any of the arms that they manufacture there?—Yes, I have.

3705. Do you know anything about the cost of them?—I do not know the cost to the Government, but some 35 years ago, I know that the arms manufactured by the Government cost them 27 dollars, but recently I have understood that they have contracted for them at as low as 13 and 14 dollars.

3706. Those are muskets?—Yes.

3707. Nearly 3*l.*?—Yes, pretty nearly.

3708. Are those the muskets used by the United States army?—Yes, they are.

3709. That

3709. That are contracted for with the makers?—Yes.

3710. Are they of a similar kind to those that are made at Springfield?—Precisely.

3711. Of the same pattern?—Of the same bore, and the same in all their character.

3712. Do you know whether those arms made at Springfield, are rifles or not?—I do not. I have seen the smooth bore; but no doubt they make both.

3713. Do you think Mr. Goodman's statement, as to the expenses of exportation being 65 per cent., is correct?—I think it is about a fair average; it would be rather less upon the finer description, and rather more upon the lower qualities of guns.

3714. In your opinion, what is the state of the export gun trade to America from Birmingham now, as compared with what it was 10 years ago?—I think that Mr. Goodman's estimate is pretty nearly correct.

3715. You do not think that the gun trade to America has altogether vanished?—No; so far from that, my house has had the greatest difficulty in getting their orders executed the last two years; it takes much longer time than is convenient.

3716. Can you state what has been the average increase in the cost of the guns in the last two years?—The advance upon guns has been less than upon any other description of goods. I should say that up to 30*s.* the advance in price may be about 10 per cent., nothing beyond that, and in the finer guns there is no advance whatever.

3717. According to that, you would believe that if there was a demand for the finer sort of gun, there would be no difficulty in obtaining the labour to make it?—That would depend upon the quantity.

3718. But there having been no advance in the finer sort of guns, that would lead you to suppose that there was sufficient profit to obtain labour at the same rate?—Yes.

3719. Have you been in the habit of buying guns in large quantities for export; any muskets?—No. I have occasionally purchased a considerable quantity of African guns.

3720. Have you found any difficulty latterly in obtaining them?—I have not purchased any in the last 12 months.

3721. You stated that you had found great difficulty in obtaining guns for export during the last two years?—Yes.

3722. What difference has that made in the time of executing the orders?—I should say a month to six weeks extra.

3723. Have you found that to be pretty equal in all the other trades?—Most other trades; they have all been very fully at work, and it has been impossible to get orders executed as fast as they were wanted.

3724. During the last two years, not only in the gun trade, but in every trade, there has been a very rapid increase in the price, has there not?—Upon almost every article.

3725. What per-centage?—It is impossible to say; there are many articles that we export now to the United States, upon which we are paying an advance of 50 to 60 per cent.; some more than that, and some things are not more than 10 or 5 per cent.

3726. Do you find that the high priced goods have less advanced in price than the lower ones?—Yes, throughout; the heaviest advances are upon goods manufactured of iron.

3727. Have you any means of telling the Committee what the number of guns that you have exported has been?—I cannot tell the Committee that, but I know that the quantity has very considerably increased.

3728. In the last five years?—Yes.

3729. Do you know sufficient of the gun trade to be able to form an opinion as to what quantity can be manufactured in Birmingham per annum?—No, I only judge from general report.

3730. Are you of opinion from the nature of the trades in Birmingham, the number of general workmen employed, and the number of men who work well with the file, that a very short time would be requisite to obtain from the various trades an increased number of men for the gun trade?—I think that might be done.

3731. Has it not been done often?—No doubt.

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3732. Mr. *Monsell.*] When did the increase of price, that you have just spoken of, commence?—About 18 months ago.

3733. What is the class of guns that you are in the habit of exporting?—From about 9 *s.* each up to 30 *l.*, varying through all the range of these prices.

3734. Are the great proportion of them what you call low-priced guns?—The great bulk consists of single guns, from about 9*s.* up to 18 *s.* or 20*s.*, and double guns from 18*s.* up to 35*s.* or 40*s.*

3735. You spoke of the cost of the Springfield musket having been, 35 years ago, 27 dollars; do you know what has occasioned the great decrease in the price?—By the Government having abandoned their system of manufacturing all themselves; they threw the contracts before the public, and the price has fallen gradually to the price that I have named, about 13 or 14 dollars.

3736. Do they manufacture them now in Springfield, in the same way that they did 35 years ago?—I am unable to say.

3737. You are not aware whether they have increased their machinery at Springfield?—No.

3738. *Chairman.*] The Government manufactured all their guns 35 years ago, did they not?—They formerly did, but the demand for them rendered it impossible; as the population increased, and they supplied the militia with muskets, it was impossible for the Government to manufacture any thing like the quantity that they required.

3739. Colonel *Lindsay.*] How many establishments were there at that time in America?—Two.

3740. How many private establishments were there 35 years ago?—I cannot say.

3741. How many are there now?—I do not know.

3742. Colonel *Boldero.*] Can you state whether any muskets have been exported from Birmingham to Russia during the last 10 years?—I have not heard that there have been.

3743. Mr. *Newdegate.*] You stated, did you not, that you had seen some of the American Government muskets?—Yes.

3744. Of what quality were they compared with the pattern now adopted by the Government of this country?—They were very excellent work, good sound muskets, differing very little from our Tower muskets; they were smooth bore, and they were extremely well manufactured.

3745. The price at which the Government contract for the arms is about 3*l.*?—Yes, about 14 dollars.

3746. Mr. *Muntz.*] Not being rifled?—Not being rifled.

3747. You are aware that the Minié rifle has a sight near the breech?—They have not that. We have long been in the habit of exporting barrels and locks, and gun-ribs, which were purchased from the importers by the gun-makers; and those barrels frequently have the names of the gun-makers engraved upon them, and they pass for American made guns.

3748. You export locks, do you not?—Yes; and a great number of parts of locks.

3749. Are those parts of locks for the purpose of repairing?—Yes; cocks and hammers, and tumblers; they are for repairing, and they are purchased by gun-smiths and a great number of gun-shops all over the country, for repairing.

3750. Supposing you had an extensive order for guns, say 25,000, no matter whether for the State or for any other buyer of a pattern, should you think that there would be any difficulty in getting them up in Birmingham?—No.

3751. Within a reasonable time?—No; if a reasonable time was given, I should not hesitate for a moment to take the order to be completed within a reasonable time.

3752. And subject to be viewed up to the pattern?—Yes, to be viewed in Birmingham.

3753. Mr. *Newdegate.*] You have stated that there has been a great advance of price, and great activity of trade in Birmingham, and that though this has caused some difficulty in the supply in all trades, including the gun trade, you have found that the expansive power of production in Birmingham has met that difficulty and overcome it?—Yes, but not quite so speedily as we could have wished; there have been delays in the completion and execution of orders. I should state that the workmen have had considerable advances of wages, and

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I am sorry to say that many of them when they get better paid are apt to do so much the less work. Mr. *H. Vanwart.*

3754. Still, notwithstanding all the difficulties, Birmingham has been equal to the demand?—Yes. 23 March 1854.

3755. And you believe that if a demand should arise from the Government of this country, and contracts were issued on reasonable terms, Birmingham would meet that demand also?—Yes, I think that they are capable of doing that.

Mr. *Thomas Lawrence*, called in; and Examined.

3756. Mr. *Muntz.*] YOU are a Bayonet Maker, are you not?—Yes. Mr. *T. Lawrence.*

3757. Residing in Birmingham?—Yes.

3758. How long have you been a bayonet maker?—I have superintended the manufacturing of bayonets and been a partner since for about seven years.

3759. You have been one of the contractors for the Ordnance work?—Yes.

3760. You have made the Ordnance bayonets for the Minié rifle, have you not?—Yes.

3761. What was the date of the tender supplied to you?—The 30th of May 1851.

3762. Was the pattern bayonet referred to in the tender ready for view when you received the tender?—No.

3763. When was it ready?—On the 7th of June.

3764. Who obtained the contract?—Mr. Heighington, for whom I at that time managed.

3765. Was the price higher or lower than formerly?—Lower than formerly; the former price was 2*s.* 10*d.*, and this contract was taken at 2*s.* 6*d.*

3766. What were the terms of the contract?—To commence delivering at the rate of 1,000 bayonets per week at the expiration of six weeks from the receipt of the contract.

3767. Did you intend applying any machinery to the manufacture of the bayonets?—Yes.

3768. Why did you not carry out that intention?—I went to Bolton, near to Manchester, for the purpose of seeing a machine of Mr. Ryder's for forging, which I thought might be applied to the bayonet. I went there three times, taking machinists with me, but I found that I had no encouragement whatever, from the new and arbitrary system of viewing the bayonets, nor from the Board of Ordnance, for having applied to the Board to inquire whether they were likely to want any increase in the number of bayonets, the Board wrote this letter on the 25th of June 1851: "I am commanded to acquaint you that, although the Board were willing further to consider your application for an extension of your contract for bayonets, should any necessity have occurred speedily for a further number, yet they are now enabled to state, that there will be no such immediate necessity, and therefore they cannot hold out to you the slightest expectation that any addition will be made to the number of bayonets contracted for with you."

3769. You stated that the price of the bayonet was 2*s.* 6*d.*; what was the actual difference between such price, and that in the former contract?—In the former contract there were two descriptions of bayonets supplied, one the old extra-service bayonet, and one the line bayonet. The price of the line bayonet was 2*s.* 10*d.*, and the extra-service bayonet 2*s.* 2*d.*, the extra-service being a bayonet that was equally good for the service as the line bayonet, but if it contained any defect which the viewer thought ought not be in the line bayonet, it then passed as extra, at a reduction of 8*d.* per bayonet, making 2*s.* 2*d.* instead of 2*s.* 10*d.* I should state that, at the same time we had also a contract for making those extra-service bayonets distinct from the line bayonets, that is to say, a contract for supplying so many of the line, and so many of the extra-service bayonets.

3770. Mr. *Muntz.*] Was the view stricter, the pattern altered, and the bayonet subjected to a test not in the contract specification?—Yes.

3771. Mr. *Dundas.*] What are the extra-service bayonets?—I only know that it is a term which was applied by the Board of Ordnance when the order was given. With respect to the question of the Honourable Member for Birmingham the first point is, whether the views were stricter with these Minié rifles

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than the previous views. I say they were ten times stricter, for the bayonets were rejected for defects which before had never been noticed. The second point is as to the alteration of the pattern. I say in answer to that, that after I had received the pattern from the Tower, the pattern referred to in the specification, there was an alteration; and they refused at the Tower to receive the bayonets that I sent down, although they were the same as the pattern that they supplied me to work to. As to the third particular, that is, that the bayonet was subjected to a test not named in my specification, it is usual in giving an order to the contractor to furnish him with a specification stating the ordeal that the bayonet is to pass through, and in my specification no allusion whatever was made to the striking of the ring of the bayonet, nor were the rings of the bayonets previously supplied struck.

3772. Did you make any complaint to the inspector of the alteration in the pattern?—I did.

3773. What did he say?—I made a complaint to Mr. Francis Lovell, after finding that complaints were ineffectual in Birmingham, and Mr. Francis Lovell said that he was quite aware that the viewer had given me a wrong pattern, that the viewer had got into a mess, and only showed himself to be a great ass. I told him that the viewer denied the fact. He said that that was very likely, for the viewer was a notorious liar. I merely use his words.

3774. Mr. *Monsell.*] Do you recollect the name of the viewer?—His name was Evans.

3775. Mr. *Muntz.*] Did the inspector admit that there was an alteration of the pattern, or any difference in the strictness of the viewing?—Most fully. Mr. Lovell did admit it, and he said that the system of viewing was different to what it previously was; he alluded to the article of locks, and he said that under the old contract, the lock was not stripped, not every limb, but under the present system the viewing was different.

3776. Did you have any conversation with Mr. Lovell, senior, about it?—He having heard of my complaint to the Board of Ordnance of the alteration in the pattern, in consequence of the Board writing to know why the order was incomplete, sent for me to come down to the Tower, and to bring the pattern with me. I went down to the Tower, and had an interview with Mr. Lovell, senior, and told him of the alteration in the pattern; he asked me to point out in what the alteration consisted, and I did so; but Mr. Lovell treated it very lightly, and said that he did not see much in it. I was about leaving, and I took the pattern up, but Mr. Lovell said, "You cannot take that pattern;" I said, "Mr. Lovell, I must take that pattern, because upon that pattern rests my defence to the Honorable Board of Ordnance for the complaint that they make to me for the non-completion of the contract." Mr. Lovell said, "The pattern does not belong to you, I shall not allow it to be taken." Then I said, "Sir, I shall inform the Honorable Board of Ordnance that you sent for me down here asking me to produce the pattern, and having got it into your power, you have retained it by force;" and upon that Mr. Lovell said, "You may tell the Honourable Board whatever you like."

3777. Did he make any remark as to the price at which you had taken that contract?—Mr. Lovell said, in allusion to the price at which I had taken the contract, that I ought to have known better than to take the contract at that price; that he himself fixed the former price of 2*s.* 10*d.* for the line bayonet, and as this Minié bayonet had more steel in it, I ought to have known better. I considered that the question of the price was a matter for the consideration of the party that I represented, Mr. Heighington ostensibly, and not Mr. Lovell, and it did not concern him at all. I did not discuss the point.

3778. Had you any reason to believe that Mr. Lovell had any antipathy to the new mode of issuing contracts?—Mr. Francis Lovell told me, more than once, and he told my partner also, that his father was greatly annoyed at the throwing open of the contracts, and that he entertained a firm conviction that eventually the Board would be obliged to revert to the old system.

3779. Did the Board revert to the old system in consequence of Mr. Lovell's representations, and threatening to enforce the contract?—They did. The Board wrote a letter, to say that the pattern had not been altered, and that unless the supply was made, in accordance with the terms of the contract, they should apply

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to other contractors to complete the order, and debit us with any difference that might arise in the price.

3780. When you found that you could not obtain any redress from the inspector, what step did you take then?—Having now been placed in the position of having either told the truth, or made a false representation to the Board, having, I should say, previously asked Mr. Francis Lovell, being placed in this difficulty, what step he would advise to be taken (that was a question asked by my partner); Mr. Francis Lovell said, "You had better write to the Board, and tell them that your men have struck," which we declined to do, because it was untrue; we appealed direct to the Board, and Sir Thomas Hastings was kind enough to give us an audience. I mentioned Mr. Lovell calling upon me, to produce the pattern, and summoning myself in the capacity of manager for Mr. Heighington, he himself being present, and Mr. Evans, the viewer, at the interview; I went minutely into the case, and after Sir Thomas Hastings had heard me, which he did very patiently, he called upon Evans to produce the pattern. Evans immediately produced a pattern, but not being the pattern, I said, "Sir Thomas, that is not the pattern; I want the pattern that was given to me to work to, and upon which my case rests." Sir Thomas Hastings then asked Evans, how it was that he had not produced the pattern; and Evans said, he did not know where it was. He then asked Mr. Francis Lovell what he knew about it, and he said, that he believed that his father had taken it with him to Enfield. Major-general Fox called upon Mr. Wood, the secretary, to make a minute of this evidence, and to order the pattern to be produced, but it was not produced during my interview with the Honourable Board.

3781. Did they insist upon your executing the order?—No; from what I could judge, Sir Thomas Hastings and General Fox were both perfectly satisfied that I had established my position, and instead of calling upon me to complete the contract, and carrying out the threat in the letter previously received, that if I did not do so an application would be made to another source, and any difference in price charged to me, the contract was agreed to be rescinded, and we were to state at what increased price we would complete any portion that we might choose to do.

3782. What number did you undertake to supply, and at what price?—Having made a considerable number of bayonets, and having lost from the vexatious view something like 400*l.*, we declined undertaking more than 2,000 at 3*s.*, and we wrote to the Board, stating that.

3783. Did you get on any better then?—We received an order for 1,998, in consequence of the division of the order amongst other contractors, but we got on no better then. It seemed to be a system of persecution carried out against us; for although before the contracts were thrown open we could with ease get on, we could not do so afterwards, though we employed the same workmen, the same material, and had ten times the anxiety and care.

3784. Had you before that time been able to supply the Board with any quantity of bayonets and other materials regularly?—We had before that time contracted for 800 bayonets per month, and commencing with 560 sea-service swords, rising to 800 sea-service swords, the Honourable Board giving us the contract, to commence with two years; saying, at the same time, that they should increase that contract if we would undertake to make them. At the same time we were able to make a number of bayonets for the East India Company as well as some of the materials, and we could have made three times the number for the Board then had it been required.

3785. That was the 1851 order, was it not?—No, before that; the 1851 order was for the Minié bayonet.

3786. With regard to the present order, what is the date of your tender for it?—The date is August last.

3787. Was this accepted?—It was not accepted.

3788. Did you get an order at last?—Sir Thomas Hastings came to Birmingham and had an interview with some of the contractors, and subsequently I received an order for 620 bayonets on the 6th of October 1853.

3789. Did you write to the Board as to the smallness of that quantity?—I did, and this is the letter, dated the 8th of October 1853: "Sir, We beg respectfully to acknowledge the receipt of the Honourable Board's order for bayonets;

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feeling ourselves, however, placed in some difficulty with our men in consequence of the smallness of the quantity, we take the liberty of mentioning the subject for the consideration of the Honourable Board. The great scarcity of good workmen in our trade at this time renders it next to impossible to obtain efficient hands, without our being enabled to hold out some prospect of a permanency in the work required, added to which we shall incur considerable expense in the requisite tools and machinery for the new bayonet; we hope therefore we may, under these peculiar circumstances, be excused the inquiry whether we can safely hire good workmen, with regard to future further supply, that we may not on the one hand run the risk of losing workmen, after having drilled and brought them properly into work, or on the other of having certain machinery comparatively useless by us without having derived a benefit commensurate with our outlay for the same.

3790. Had you any reply to that letter?—Yes, I received a reply to it, dated the 14th of October: "Gentlemen,—With reference to your letter dated the 8th instant, I am directed by the Board to acquaint you that the present price of the bayonet is so high as to prevent extensive orders being given for them; as, however, it is probable that a considerable number of bayonets will be required, the Board will apply to you for an offer, and should your tender be the lowest it will be accepted."

3791. Colonel *Lindsay.*] What was the price?—Seven and sixpence; to that I wrote the following letter, dated the 20th of October 1853: "G. Butler, Esq. Sir,—We beg respectfully to acknowledge the receipt of the Honourable Board's reply to our letter of the 8th current, in which we note the Honourable Board's allusion to the price of the bayonet as being a bar to extensive orders, and we beg respectfully to assure the Honourable Board, that it is far from our desire to overcharge our manufacture. With respect to the bayonet now ordered, as we have as yet made none of that pattern, we are unable to form so correct an estimate of its actual cost as can be done by those who have already manufactured them; the great difficulty in making articles to pass view, since the throwing open of the contracts, is the principal reason of their increased cost; after all possible care and pains taken the rejections have been so great, and the cause so slight, that both employers and workmen have been heartily discouraged, and we firmly believe that exorbitant prices have been the result of such unparalleled strictness. To work for the Honourable Board, where payment is sure and the returns so quick, would appear to be a great desideratum, and induce not merely a preference, but a moderate price also; and this would really be the case had not the view been so unnecessarily strict, that a manufacturer scarcely knows how to calculate a price which may eventually insure him from being a positive loser through the numerous chances of a Tower inspection. To make a good and serviceable article, equal to sample in every respect, will be our strenuous endeavour; and we earnestly hope that the ordeal to be gone through will not prove a preventive to the tendering at such price as may be acceptable to the Honourable Board." To that I received no reply.

3792. Mr. *Muntz.*] Have you ever used any machinery, or effected any improvements, in the manufacture of bayonets of the present pattern?—Yes; I should state that, after the receipt of the order for 620 bayonets, a letter came from the Honourable Board stating that an error had been made. This communication was a fortnight after the receipt of the order, and is dated the 21st of October last: "Gentlemen,—you are hereby informed, with reference to the Board's letter of the 6th October, that your tender is accepted for the supply of 2,300 bayonets instead of 620, as was stated in error. You are further desired immediately to acknowledge the receipt of this letter." Upon receiving a larger order, I made up my mind, as far as I could, to effect any improvement by machinery to economise labour. I knew how Mr. Stephen Hill had made portions of his bayonet by machinery, and I also knew from Mr. Hill the great loss that he had been subjected to by a previous order from the Board, which he stated was something like 200*l.* I more particularly mention this, because Mr. Anderson called at Mr. Hill's manufactory, and no other manufactory in Birmingham in the bayonet way. Mr. Stephen Hill is a highly respectable manufacturer, but one of the old school, and it is rather difficult to get those into the new school; with respect to the bayonet ring I found that Mr. Stephen Hill

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forged it; a die was sunk for this ring (*producing the same*), and the ring sunk at once; Mr. Hill has now adopted it, and then, instead of that peculiar treadle which Mr. Anderson so graphically described that he saw at Mr. Hill's employed for this ring, it is bored out by machinery. Then, instead of by the hand drilling this (*pointing to the bayonet*) in the old fashioned way, this was also done by machinery; instead of filing this off (*pointing to the part*) this was also drilled out; as regards "the locking ring" which Mr. Anderson spoke of, I think he also said that he noticed the manner in which the bayonet-motion was done, it was drilled and then filed out; this (*pointing to the same*) I have done by machinery.

3793. Did you hear Mr. Anderson's description of his intended bayonet machine?—I did.

3794. Did you understand it?—So far as my memory goes I will state what I understood of it. Mr. Anderson assumed, for the sake of argument, that the bayonet might be required of the present pattern, that is to say, part iron and part steel, and he said that he proposed to have a bar of steel of a peculiar form from the steel manufacturer, which bar of steel, by some intended mechanical process, was to be welded on to a solid piece of iron; then the neck was to be formed by the use of Ryder's forge; then the cutter of Ryder's forge was to form the angle at the shoulder of the bayonet, and a die, the corresponding angle which was to form this (*describing the same*), and prepare it for the next shape; then Ryder's forge was to draw the bayonet down into this shape (*describing the same*), or something like it; then Mr. Anderson, I think, spoke of employing a series of certain American oscillating drops, so that you should push the bayonet through the first drop, which we will call No. 1, and it would receive a groove and so on to No. 2, so much further to No. 3 and No. 4 till the bayonet was so elongated that it assumed something like the present shape. Then his next process was a series of drilling, and his last boring; then came the grinding, and, so far as I understood him, he proposed to grind by revolving cutters. Then, with regard to the bending of the neck, Mr. Anderson proposed to have a certain machine, which would bring the neck bent into its proper fold, and then the bayonet would be finished. But Mr. Anderson did not say, at least I did not hear him, anything at all about hardening the bayonet. Now I am at a loss to understand how Mr. Anderson, supposing that he grinds this bayonet with the circular cutters, would be able to harden it afterwards; for this reason, that the bayonet must be set perfectly straight, and the heat in hardening would throw it out of the direct line; and not only that, but supposing he were, by any machinery which he might devise, to succeed in it, still the process of hardening would induce a scale upon this bayonet bringing back the same difficulty; it could not be polished off, as it must be hardened to spring temper, and it would be quite as hard as the cutters themselves, and consequently they would not cut. Then I understood him to enforce the adoption of machinery, because you could economise labour by employing it; but I am at a loss to understand how he would gain any benefit by using machinery for bending this neck, because a youth could bend them only as fast, and no faster, than they were heated; and you might, at something like 9 *d.* a dozen, do bending enough in a fortnight to last 12 months.

3795. You think that Mr. Anderson's plan for making bayonets very cheaply will not be realised?—I am quite certain that the idea of that bayonet (*pointing to the same*) being produced at 1 *s.* 6 *d.* or 2 *s.* is illusory.

3796. Or the bayonet that you are working upon now?—Yes; I speak of the present pattern.

3797. Are you behindhand with your present order?—Yes.

3798. How much?—Considerably; but it would take me some time to explain the causes.

Veneris, 24° *die Martii*, 1854.

MEMBERS PRESENT.

Sir W. Molesworth.	Lord Seymour.
Mr. Monsell.	Colonel Dunne.
Colonel Boldero.	Colonel Lindsay.
Lord Paget.	Mr. G. Dundas.
Mr. Newdegate.	Mr. Geach.
Mr. Walpole.	Mr. Muntz.

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Mr. *Charles William Lancaster*, called in; and further Examined.

Mr. *C. W. Lancaster.*

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3799. Mr. *Muntz.*] YOU stated the other day, with respect to the capability of the manufacturers in Birmingham to execute orders, and as to the number of workmen employed there, that your information was obtained from Mr. Tranter?—Yes.

3800. Did you receive it personally from him, or by letter?—Personally.

3801. Do you know his handwriting?—I can show the Honourable Member many copies of his letters; I cannot say that I know it personally; my clerk will bring three or four letters, and compare the handwritings.

3802. Will you look at this letter (*handing the same to the Witness*)?—Is that in Mr. Tranter's handwriting?—It merely states that I have no authority to make use of his name; I am willing to admit that; but I still state that he made that statement to me most distinctly.

3803. The letter is directed to Mr. Swinburne, and he says, "Mr. Woodward has waited upon me to-day respecting a statement made by Mr. Lancaster to the Committee relative to the number of men employed in the gun trade, and mentioned my name as his authority for what he said. In answer to this, I beg to acquaint you that I have not seen Mr. C. Lancaster for six or seven months. I am quite ignorant of the number of men employed in the trade, and have given Mr. Lancaster no authority to make use of my name in any way in the matter; he has done so without my knowledge"?—He states that he has not seen me for six or seven months; the letter does not deny having seen me, nor does it deny having told me.

3804. He says that you had no authority for your statement?—I still say, and repeat most distinctly, that Mr. Tranter, gave me this statement himself, and I have the date on which he called upon me.

Mr. *Thomas Lawrence*, called in; and further Examined.

Mr. *T. Lawrence.*

3805. Mr. *Muntz.*] ARE you behind-hand with your present order?—I am.

3806. Why are you so?—There are several reasons. In the first place, with regard to the order for this new bayonet with the locking ring, the first time they were ordered was the commencement of last year. I tendered with other contractors, but I did not get any portion of the order, consequently I had no stock when I received this order; nor had I any advantage in making any, so as to have any progress. Secondly, I was very anxious, after receiving a letter from the Board of Ordnance, stating that the price was a bar to any future orders, but if the price was lowered, more would be wanted, and the lowest tender accepted, to effect all the improvements I could by machinery; but in making experiments with the machinery, I found that it did not succeed so quickly as I had expected, which has been a great cause of the delay.

3807. Have you completed your machinery now?—Very nearly; indeed so far that I can in a very short time go on with the supply, and eventually make up the arrears.

3808. Shall

3808. Shall you be able, in a comparatively short time, to make any considerable increase in your manufactory if it be necessary?—Yes.

3809. Have you met with any difficulties in regard to the order that you have now in hand?—I have delivered so few that I cannot speak of any difficulties. I would remark, with respect to one pattern bayonet being delivered to seven contractors, that when I returned the pattern into the store at the Tower in Birmingham, I asked whether they would be good enough to mark one of my bayonets which they considered equal to the pattern, that I might have a standard pattern to examine by. This request I made to the clerk.

3810. Had you this pattern in turn amongst the whole of you?—Yes.

3811. How long was each party allowed to keep it?—Till he had done with it.

3812. How long was that?—I think I had it for three or four weeks.

3813. How many contractors were there?—Seven.

3814. Were you the last man that had it, or the first?—The first; I had it for three weeks; as I before stated, four of the contractors had previously made the bayonet, and I requested that they would be kind enough to select one of my bayonets that was equal to this pattern, and mark it for me as a standard pattern, but they said that their instructions were to mark nothing.

3815. Then the trade was confined to that one sample?—Yes.

3816. Mr. *Monsell.*] When were you told that their instructions were to mark nothing?—When I returned the pattern to the store.

3817. At what time was that?—It was about October, I suppose.

3818. Mr. *Newdegate.*] October last?—Yes.

3819. Mr. *Monsell.*] Are you satisfied with the way in which the view is now conducted?—I have delivered so few, that I cannot form any opinion except from hearsay; from hearsay, the view is very different from what it was during the time of the previous inspector. I can mention one instance in which Mr. Hill, one of the contractors, stated that he was satisfied, and he calls it a good view if out of the number he sends, he passes half; he sent down 70, and, to his surprise, 69 out of the 70 were passed.

3820. How long ago was that?—I cannot give the dates.

3821. Was it within the last fortnight, since Mr. Gunner has been appointed?—Yes, certainly.

3822. You cannot state from your own knowledge whether the view is satisfactory now?—Not as to my own bayonets.

3823. Have there been more or fewer of your bayonets rejected in the last fortnight than there were six weeks ago?—I have sent none in within the last fortnight.

3824. Did you not send in some on the 8th of March?—No, I think not.

3825. The return that I have before me shows that there were 26 delivered on the 9th of February, 12 accepted and 14 rejected; and on the 11th of February, 35 were delivered and 35 rejected?—That is right.

3826. On the 20th of February there were 20 delivered, 6 accepted and 14 rejected; on the 4th of March there were 42 delivered, 5 accepted and 37 rejected; and on the 8th of March there were 37 delivered, 16 accepted and 21 rejected; can you state whether that is correct or not (*handing the return to the Witness*)?—This number of 42, sent down on the 4th of March, is the same as the 37; that is to say, the 42 were viewed and 5 accepted; and the viewer sent word to say, that with some alterations, more would be taken, but he would require a fresh note. He had a fresh note, without a delivery, and that accounts for it.

3827. There having been some slight alterations made, the results which I have described are correct?—Yes, I believe them to be correct.

3828. Colonel *Boldero.*] How many bayonets could you make in a year in your own manufactory?—I could make from 10,000 to 15,000.

3829. Do you think that there is a sufficient number of bayonet-makers in Birmingham, to make 150,000 with 12 months?—I do not think that the present number of contractors could make 150,000 of the present pattern during the first 12 months; but I have no doubt whatever that, with a fair view and nothing vexatious at the Tower, they could for the first year, amongst them, produce 90,000, and in the second year double that.

3830. It has been stated in evidence, by Mr. Millward, in answer to this question, "How far can you give an answer as to barrels?—We could make

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150,000 per year in Birmingham, the present contractors, which offer we have already made to the Board of Ordnance, if they will give us a contract extending over five years." If you had a similar contract in Birmingham for making bayonets, could you supply 150,000 bayonets in the same way as the barrel-makers could supply the barrels?—If the contract extended over five years, I have no doubt it might be done.

3831. Supposing that there was a contract for 100,000 bayonets, do you think that they could be provided for 25,000 *l.*, or 5 *s.* a piece?—Of the present pattern?

3832. Those which the Ordnance demand?—I do not think they could be done for that price.

3833. In the component parts of a musket, which is the most difficult to obtain, the barrel, the stock, the lock, or the bayonet; is it the lock?—I am not sufficiently acquainted with the component parts to give a correct answer; so far as my opinion goes, I should think that the lock was the most difficult to get up.

3834. Mr. *Monsell.*] You stated yesterday, did you not, that in the year 1851 you had reason to complain of the conduct pursued towards you by the Government department at Birmingham?—Yes.

3835. The chief complaint that you made was, that some alteration had been made in the pattern of the bayonet?—One of the complaints was that.

3836. Will you just describe the nature of the alteration that was made?—The pattern bayonet was about the eighth of an inch longer in the socket than they would afterwards take the supply of, and the pattern bayonet supplied me was very far inferior to many of those that I supplied; and that they rejected.

3837. Were there not two bayonets marked, and did you not keep one of the two, while the other was kept at the establishment at Birmingham, and were you not informed that any bayonets that were delivered equal to that pattern would be received?—No, that was with the order for the 2,000 afterwards accepted, not for those of which you are speaking.

3838. At all events, you obtained no redress in Birmingham, and you appealed to the Board of Ordnance?—I did.

3839. Your contract was lower then, was it not, than that of any contractor at the time?—Yes.

3840. The Board of Ordnance heard your complaint, and gave you redress; they allowed you to withdraw from the contract?—Yes, they allowed me to elect how many out of the remaining number of the 10,000 taken to I would make.

3841. In point of fact, you had a grievance that was not redressed at Birmingham, and when it was brought before the Board of Ordnance upon your appeal to them, they heard your statement, and they consented to give you all the redress that you were reasonably entitled to?—No.

3842. Will you explain why it is not so?—I appeared before the Board of Ordnance in consequence of Mr. Lovell having denied my statement that there was any alteration whatever in the pattern, and also in consequence of their having subjected my bayonets to a test that was not in the specification. It is usual in all orders given to contractors to append a specification stating the test to which the bayonet is to be subjected. Those bayonets were all struck on the ring, and struck so heavily that a number of the rings were broken. I think we had something like between 5,000 and 6,000 bayonets in different stages, and they would not take any without striking them on the ring, which was a great loss. I suppose the gross loss was something like 400 *l.*; and I did not consider that we did get redress, for we had nothing for that loss.

3843. In your specification, did not one of the parts of it mention that the ring of the bayonet was to be struck in that way?—No; Mr. Lovell was asked the reason when before the Board, and he said that it was an omission; Mr. Francis Lovell.

3844. Mr. *Newdegate.*] By "omission," you mean an omission in the specification, do you not?—Yes.

3845. Lord *Seymour.*] Have you the specification here?—Yes (*producing the same*).

3846. That is the specification of 1851, is it not?—Yes.

3847. Will you state what the test is?—The bayonets will be examined by the plug, and must fit exact; they will be struck on a stock or anvil at the bend of the neck, and the blade bent over a block in the usual manner; the blade will be

be gauged in three places, and examined, to see that the grinding and polishing has been properly executed.

3848. It says that they will be struck on a stock or anvil at the bend of the neck?—Yes.

3849. That is in the curved part, between the ring and the blade?—Yes.

3850. But it does not say that the ring will be struck; is that the complaint that you make?—Yes, and also that the rings were not struck, not as a rule, with previous supplies.

3851. In previous supplies that you had furnished to the Ordnance, the ring had not been struck?—No.

3852. Therefore, this was a new test to which the bayonet was subjected without any intimation being given to you?—Yes.

3853. Mr. *Monsell.*] Was there a ring in the former bayonet at all? Yes; I will show it to the Committee. This is the line bayonet, and this is the ring (*pointing to the same*).

3854. Mr. *Dundas.*] In what way was the ring struck?—A man holds it thus (*describing the same*) against a vice, and with a hammer strikes it so (*describing the same*). This bayonet was passed. Sometimes it has so happened, that after the bayonets were accepted and passed, they came to London, and were afterwards rejected. This (*producing a bayonet*) happened to be rejected after it was passed; it was a loose ring, which proves that it had not been struck.

3855. Colonel *Boldero.*] Is it welded on?—Yes.

3856. Why should not the Ordnance require it to be struck; the welding may be bad; there is good and bad work done in welding; you cannot detect it unless you strike a blow upon it; the eye could not detect it?—The eye could not always detect it; still, on the other hand, a blow might break the ring, and in many cases, instead of breaking it where it was welded, they were broken off in the solid.

3857. Colonel *Lindsay.*] How would you try the welding, if it is not to be struck?—My complaint is this, not to dictate to the Board of Ordnance the tests that they shall apply, but I complain of their applying a test not in the specification. This bayonet is the one (*exhibiting the same*) for which we used to have 2*s.* 10*d.* This (*exhibiting the same*) is the article now said to be made for 7*s.* 6*d.* for the Minié.

3858. *Chairman.*] Can you describe the difference between the new bayonet and the old one?—The old bayonet is much larger in the bore of the socket, and is much heavier altogether; the neck is iron, and a portion of the blade, something like six inches, is also iron, and the old bayonet has no locking ring to it; the new bayonet, the recent pattern, is all steel with the exception of the socket, and has three hollows in it instead of two, which makes it more difficult to make, and also a locking ring round the socket, working upon the face of the socket.

3859. What is the difference of price between the old and the new bayonet?—The old one is 2*s.* 10*d.*, and the new one 7*s.* 6*d.*

3860. Is the new bayonet a superior article altogether?—Altogether as different as light from darkness.

3861. Is it a lighter bayonet?—Yes, it is; the new bayonet weighs between 11 and 12 ounces, and the old one is under 16 ounces.

3862. Mr. *Dundas.*] The socket is iron; if it were all made of steel, would it be at all detrimental to the weapon?—No, I do not think it would.

3863. From the evidence of a former witness, the Committee were given to understand that if the weapon were entirely made of steel, it would be very much more easily fabricated; is it your opinion that it would be so?—I believe that if that bayonet were all made of steel, it might be made more easily, and for this reason: as far as regards the forging of the bayonet, this bayonet is part iron and part steel; and if instead of being iron in this part, and a solid part of steel here (*pointing to the same*), if it were all steel, it might be done at one process instead of two, and it would take less forging. I now speak of employing machinery for the purpose.

3864. It is your opinion, that if the bayonet were made entirely of steel, it could be made not only better, but at a lower cost?—I will not exactly say that, because the price of steel is double the price of iron; I should first have to see, although I think it would be a better bayonet, whether the saving made in one way was tantamount to what was gained in the other.

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3865. Mr. *Monsell.*] Will you state the price of the materials of which the present bayonet is made; it is made partly of iron and partly of steel, is it not?—Yes.

3866. How much steel is there in it, and how much iron?—The weight of the steel before it is forged, allowing for the waste, taking it as this is (*pointing to a specimen*), is about a pound.

3867. How much is steel per pound now?—Steel now has risen; 45*l.* a ton; about 4½*d.* a lb.

3868. How much iron do you use?—The iron would be over one pound, because we make the socket solid and have it drilled afterwards.

3869. How much would that pound of iron cost?—I believe, for the iron in order to get rid of the grays, 25*l.*, which I have from Mr. Marshall; that is the best that he makes.

3870. That would be about 2½*d.*?—Yes, or 3*d.*

3871. Then the materials of the bayonet now cost something about 7*d.*?—Yes, but an allowance is always made for the risk in manufacture; sometimes, which has been the case with me, however careful Mr. Marshall is, we get a great deal of iron that turns out gray; and I should say, that to cover the manufacture without any loss, this would cost 1*s.*; that is to say, to allow for the contingencies of bad steel and bad iron, the manufacturer must call it 1*s.* to cover him.

3872. Then the cost of the bayonet is made up by 1*s.* for materials, and 6*s.* 6*d.* for labour and profits?—Not exactly that, because there is the locking ring, which is separate altogether.

3873. Of what material is that made?—Of iron.

3874. Do you not include that in your calculation of 1*s.* for materials?—No.

3875. How much additional would you put down for that?—About 3*d.*

3876. Then the true proportions would be 1*s.* 3*d.* for materials, and 6*s.* 3*d.* for labour and profits?—Yes.

3877. You stated yesterday, did you not, that Mr. Hill thought that you were going rather too fast with machinery?—No, I said that I thought Mr. Hill was going rather too slow.

3878. He does not imitate you?—I cannot exactly answer that question; I have no doubt that Mr. Hill will imitate anything that turns out to his advantage.

3879. Do you think it quite impossible that some other persons may appear, who may have more advanced ideas on the subject of machinery than you have at present, and who may improve upon your present machinery?—I think that I, myself, may always go on improving, and, therefore, keep them behind hand.

3880. Do you consider that still further improvements may be made in machinery, for the purpose of making bayonets?—Yes.

3881. And those improvements, of course, if judiciously carried out, would reduce the cost of making them considerably?—I think that that is rather a difficult question to answer.

3882. You spoke, for instance, of Ryder's forging machine, do you think it at all applicable to assist in working out the neck and the blade of the bayonet?—Yes, I think it is, but at the same time I think that machinery much less expensive than that would do equally as well. I think Mr. Ryder asked me 130*l.* for one of his machines, and to pay that money for the purpose of forming this neck, would be ridiculous.

3883. That would depend upon the number that a machine would produce in a year, would it not?—If you could do the same work for one-tenth of the cost, I apprehend that the question of number would not affect it.

3884. Do you consider that machinery may be invented for the purpose better than Ryder's machine?—Yes, to form the neck.

3885. Are you acquainted with the steam hammer?—No, I am not.

3886. Do you know whether that could be applied with advantage to complete the forging of the neck and socket?—I dare say it might.

3887. Do you consider that oscillating steel dies would not forge the blade into a smooth surface with advantage?—I should not like to give an opinion upon that, without I saw them working.

3888. Are you acquainted with oscillating steel dies?—I think, judging from Mr. Anderson's description of them, we may take them to be a series of dies in which

which the bayonet is put; I think it might be done in a much simpler way than by those oscillating steel dies.

3889. That would be an improvement upon Mr. Anderson's ideas as to the machinery; still you consider that the object which he had contemplated could be effected?—No doubt; it is effected now.

3890. Do you consider that at present that which would be done by Mr. Anderson's proposed oscillating dies is done by machinery?—I have an estimate of a machine to make this bayonet, which I consider to be a better method than Mr. Anderson's.

3891. Is it at work now?—No, it is not at work, and for this reason: that although I had an estimate of it, and felt that it would be successful, it was just at the time when there was a rumour that the Government intended to manufacture them themselves, therefore I did not like to go to the expense.

3892. Still if you had a large order you would be inclined to adopt the machine?—Decidedly.

3893. Colonel *Dunne.*] Were you engaged for Mr. Hill in January 1853?—No, I never managed for Mr. Hill at all.

3894. Mr. *Muntz.*] Speaking either of the machinery for manufacturing bayonets, which is proposed by Mr. Anderson, and of which you gave the Committee yesterday a description, or of the machine which you have referred to in a case you should determine to erect it for that purpose, are you of opinion that such a bayonet as that before you could be made for the price that has been named?—No, I am sure that it could not.

3895. Two shillings was the price, was it not?—One shilling and sixpence, they said.

3896. You do not contemplate that by any machinery you could manufacture them for 1*s.* 6*d.*?—No.

3897. Have you any idea what reduction of price you would effect with your proposed machines?—I have no doubt that improvements in machinery would effect a considerable reduction, but I should not like to give a speculative opinion without trying.

3898. When you were speaking of the number of bayonets, you stated that a great number might be manufactured by the contractors; are there any other bayonet makers now in Birmingham but the present contractors?—No, I think not.

3899. Mr. *Newdegate.*] The present pattern bayonet, you say, is not easy to manufacture by machinery?—Not in all its parts.

3900. There is a great difference between the price of the one bayonet, which costs 7*s.* 6*d.*, and the price of the cheaper bayonets which had been previously ordered and received by the Board of Ordnance?—A great difference.

3901. What is the difference?—The one is 2*s.* 10*d.* and the other is 7*s.* 6*d.*

3902. The form of the 2*s.* 10*d.* bayonet is very different from the form of the 7*s.* 6*d.* one, is it not?—Yes, and it is also different in material, because the present pattern is all steel, with the exception of the socket; and the old pattern has an iron neck, and six inches of iron in the blade.

3903. And there are certain portions of work added, and a new form of ring to the new bayonet which were not in the old?—Yes.

3904. Therefore the difference in the price represents the difference in the construction and in the quality, does it not?—Yes, as well as in the material.

3905. No comparison, therefore, can be made between the two bayonets in price, because they are essentially different articles?—Just so.

3906. Colonel *Lindsay.*] You stated, did you not, that you had occasion to write a letter to the Board of Ordnance, in consequence of your not being able to supply your bayonets at the time by which you were to deliver them in?—No, but I did do so.

3907. What was the date of the letter that you alluded to yesterday?—I alluded to two yesterday; one was October the 8th, and the other was October the 14th, 1853.

3908. You stated in that letter, if I recollect rightly, that you could not furnish them as soon as you hoped to have been able, in consequence of the scarcity of hands and the preparation of tools?—I presume that the Honourable Member alludes to the letter of the 8th of October, in which I acknowledge (it is simply an acknowledgment) the Honourable Board's order.

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3909. Will you explain what you meant by the passage relating to the scarcity of good hands?—I will read the letter again: "We beg respectfully to acknowledge the receipt of the Honourable Board's order for bayonets; feeling ourselves, however, placed in some difficulty with our men in consequence of the smallness of the quantity, we take the liberty of mentioning the subject for the consideration of the Honourable Board. The great scarcity of good workmen in our trade at this time renders it next to impossible to obtain efficient hands, without our being enabled to hold out some prospect of a permanency in the work required."

3910. Does that mean to imply that there was a scarcity of good workmen, or not?—It means that they could not be got in consequence of the order being so small; if the order had been sufficiently large, good workmen could have been got to do it.

3911. Did it also mean, that in consequence of the order being small, the wages to good workmen would be less?—No; but that there was no inducement by obtaining a permanent situation to good workmen, because the number of bayonets would be so soon finished.

3912. As each contract is finished, does the workman lose his employment with the master?—When it is finished, if there are no other bayonets to be made, he must of course be put to something else.

3913. Lord *Seymour.*] Upon what do you employ that class of men when you have not a contract for bayonets?—The men of that class, when there is no contract, we cannot employ.

3914. Mr. *Muntz.*] Is not this the fact; that no man who is in a comfortable place at work will leave his employment to go to a job for the Ordnance Office?—Just so: that was the reason that I wrote this letter.

3915. Lord *Seymour.*] You wrote that letter when you thought that the order was for 620 bayonets?—Yes.

3916. You found afterwards that that was an error, and the order was intended for 2,600 bayonets?—For 2,300.

3917. You took the order for 2,300 on about the 21st of October?—Yes.

3918. Having taken that order on the 21st of October, how soon did you find out that you had a bad quality of iron, for your first letter in January complains of the quality of the iron?—As soon as we began to complete the bayonets.

3919. From whom did you obtain that iron?—From Mr. Marshall.

3920. Had you paid a high price in order to obtain the best quality?—Not for the first iron. The circumstances was these. I had made none of those bayonets before, and I wrote to Mr. Marshall, asking him to supply me with iron for the Government bayonet, of the same quality that he supplied to the other contractors, but leaving it to him, taking it for granted that it would be of the right quality; it did not turn out so nice as I wished in consequence of the grays, and I saw Mr. Marshall upon the subject. I said I would sooner pay the highest possible price than be subjected to this loss; the difference between 25 *l.* and 18 *l.* a ton is no consideration compared with the loss of the bayonets rejected on account of the grays.

3921. Having taken the contract for this large number of bayonets, 2,300, in October, why did you not lay in a stock of coals, instead of going on from hand to mouth, as you seem to have done, until the severe weather stopped the supply?—I ordered it, and it was the case with others, but in consequence of the water in the pits, the supply was short everywhere; I had ordered some number of boats which were not sent in; it is not only the bayonets I make, but it stops other work as well.

3922. You stated that the severe weather stopped your supply. As you had taken this large order for 2,300 bayonets in October, you ought to have provided yourself with coals before the severe weather came, ought you not?—The quantity of coal required for that number of bayonets is but small; but it is one of the reasons, amongst others, that I gave for being prevented going on with the bayonets as quickly as I wanted.

3923. That was not a very good reason, was it?—That was one of the reasons.

3924. You have stated that if the whole of the bayonet was made of steel, there would be, perhaps, some economy in the manufacture of it?—I think so.

3925. If

3925. If it was made of steel would it equally stand the test to which it is put by the Ordnance?—I should say that it would equally, in every respect.

3926. Did you ever propose to the Ordnance to make it all of steel?—No.

3927. In the specification it was stated that part was to be steel and part iron?—Yes.

3928. Mr. *Monsell.*] You stated, I think, that the cost of the material of the Minié bayonet would be somewhere about 1 *s.* 3 *d.*, and did you not state that the material of the old one cost about 10 *d.*?—No.

3929. Would that be somewhere about the price of the material of the old bayonet?—No.

3930. How much do you think it would be?—Somewhere about 8 *d.*

3931. Then the one costs, for labour and profit, somewhere about 2*s.*, and the other about 6 *s.* 3 *d.*?—The difference between the two bayonets is considerable in every respect.

3932. The difference in the material is the difference between 8 *d.* and 1 *s.* 3 *d.*?—Yes.

3933. Deducting 8 *d.* from 2 *s.* 10 *d.* leaves 2 *s.* 2 *d.*, and deducting 1 *s.* 3 *d.* from 7 *s.* 6 *d.* leaves 6 *s.* 3 *d.*?—Yes.

3934. Is there three times as much workmanship in the one as in the other?—Yes.

3935. If suitable machinery were applied to the manufacture, do you think that that difference might be considerably diminished?—I think, by employing machinery, the bayonet might be made cheaper, but till it was brought fully into play I should not like to say.

3936. Colonel *Boldero.*] The difference in price between the two bayonets arises, does it not, from these causes: in the bayonet of 1853, the materials are better, the form is different, the construction of it more difficult, the length is one inch more, and the weight is considerably diminished; is that an accurate description of the new bayonet?—Yes, of the difference.

3937. Mr. *Muntz.*] There has been a great deal said about the statement that you had found a difficulty in obtaining men at one time, and that there was a difficulty in obtaining men for so small an order, in consequence of the uncertainty of the time that they would be employed; what is your opinion as to the state of the trade now; supposing you had a large and consecutive order for bayonets, should you find any difficulty in obtaining workmen to the extent that you desired, if they could be permanently employed?—I do not think I should.

3938. Something has been said about coal, and that you made an excuse last winter in consequence of the difficulty you found in procuring a supply; you were no worse off than your neighbours, were you?—Somewhere about the same.

3939. It was notorious in Birmingham, was it not, that the state of the weather, and the condition of the roads and the pits was such, that Birmingham had never been so short of coal for the previous 50 years, and that three parts of the works in the town, and near the town, were standing still altogether for want of coal?—Just so; I was obliged to allege the same reason to a Liverpool merchant, whom I supply with another article.

3940. Mr. *Newdegate.*] The price of coal rose, in consequence, full one third, did it not?—Yes.

3941. Mr. *Monsell.*] You stated, did you not, in your letter of the 16th of January, as one of your reasons for not completing your contract within the time, that your "blade-forger, the only one that you had, had had a severe illness for three weeks, and only returned to work on Saturday last;" did you find a difficulty in getting another blade-forger to supply his place?—Yes, to get another blade-forger to supply his place would have been a difficult thing.

Mr. *Joseph Brazier*, called in; and Examined.

3942. Mr. *Muntz.*] WHERE do you reside?—At Wolverhampton.

3943. Are you a lock manufacturer?—Yes, I am.

3944. Is that your only trade?—Not exactly; we manufacture other things connected with the gun trade besides.

3945. Are you a contractor for gun locks for the Board of Ordnance?—Yes, I am, for this last order.

3946. How long have you been a contractor?—Since the year 1836.

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3947. You had your first contract then?—Yes.

3948. Have you continued to be a contractor from that time to the present?—Not to the present time; I continued to be a contractor till 1850.

3949. You are a contractor now, are you not?—I am, in this last order; only in this last order.

3950. Had you no contracts between 1850 and the last order?—No.

3951. Is there any reason why you should not have continued your contracts during the whole period?—The orders were so very small, together with the litigious inspection, that I did not think it worth my while to attend to it.

3952. Did you find the view very vexatious?—Yes.

3953. And in consequence, the workmen would not work for you?—It was unnecessarily vexatious.

3954. Were you an exhibitor at the Exhibition of 1851?—Yes.

3955. What did you exhibit?—I exhibited the best gun locks for double guns and rifles principally, and also improvements; among other things, I had a new line musket lock, which was rejected from the Tower at Birmingham.

3956. For what reason?—I could not see any fault in it myself; I have the lock here, and I shall be very glad if any gentleman who is a judge will look at it and pass his opinion on it. This is it (*producing the same*).

3957. Is that the same as when it was exhibited?—Exactly the same.

3958. You cannot understand why it was rejected?—No other than that they must send something back, whether there was any fault in it or not.

3959. Have you found that to be the practice?—I have.

3960. Have you ever sent any locks to be viewed again that had been returned?—Yes.

3961. Were they objected to again?—They have been occasionally.

3962. Have any of them been passed without alteration?—They have.

3963. What is your opinion of the present lock for the Board of Ordnance; is it a good one?—It is the best that has ever been made for the Ordnance.

3964. Have you ever seen any of those celebrated pistols, called Colt's pistols?—Yes, I have.

3965. Have you examined them?—Yes.

3966. What do you think of the work in them?—The barrel is very good, and it is rifled well, and the cylinder, but I do not see anything else good in it.

3967. Is not the lock good?—I call it good for nothing.

3968. What do you mean by that?—It would not work permanently.

3969. Do you mean to say that it is not fitted sufficiently well to stand the work?—It is of a very common description; I may say of the commonest description.

3970. Do you mean that with respect to the materials used in it, or as to the construction of it?—I mean as to the construction and the workmanship.

3971. Are not the parts properly fitted?—They are not fitted at all as they ought to be.

3972. What does that arise from?—I cannot say exactly what that arises from; it arises from defective workmanship, in a great measure; it is badly constructed.

3973. On comparing the work of this pistol of Colonel Colt's, as respects the locks, with the work in the locks which you make for the Minié rifle, what is your opinion upon them?—There is no comparison between them as to workmanship.

3974. Are you of opinion that if such locks as those made by Colonel Colt were used in the Minié rifle, they would not permanently stand the wear and tear?—They would not.

3975. What is your opinion of the statement, that the different parts might be thrown together into a basket, and taken out indiscriminately and fitted together?—I do not believe a word of it.

3976. Did you examine the pistols, to see how far that was possible?—Yes; and the limbs were all numbered and marked, and it did not appear as if they would reverse out of one pistol into another.

3977. Were the limbs of each pistol lock marked with one number?—Yes.

3978. And the limbs of another marked with another number?—Yes; and the object was, I apprehend, that if they were intermixed, they should find which belonged to each pistol by the number.

3979. Have you ever seen them made?—No.

3980. What other object could there be in marking them but the one you have stated?—I do not see any other object.

3981. Was there any delay on your part in executing the present order?—Yes, at first; an alteration was made in the pattern. I suggested some alteration in it, and I made it my business to go to Enfield to see that it was carried out according as I directed.

3982. When was the alteration in the pattern made; how long after you had the contract?—A few days.

3983. What was the alteration?—It was taking away the pin which holds the mainspring down to the eye, and substituting another method of holding it.

3984. You went to Enfield to see that perfected?—Yes.

3985. Was the alteration made in a manner so as to satisfy you?—When I got there I recommended some little further alteration.

3986. How came you to go to Enfield?—I went on my own account to see it done as it ought to be done.

3987. Had you notice given you that there was to be an alteration?—I suggested the idea to Mr. Gunner.

3988. It was not a suggestion of the Board of Ordnance?—No.

3989. You suggested it?—Yes, I did.

3990. Would the lock have been as good without alteration?—I thought it much better with it.

3991. Did you hear the evidence that has been given before this Committee as to the advisableness of returning to the old roller lock?—Yes.

3992. What do you think of the plan; would the lock be as good?—Very bad; it would be nothing like the swivel.

3993. It would be going back 100 years, would it not?—Longer than that.

3994. Was any extension of time allowed you after the 6th of October?—One month.

3995. In consequence of the delay that had taken place?—Yes, in the alteration; in fact, after the first alteration which I suggested, they suggested another themselves, by removing the lump that the main spring bears against, further up the plate.

3996. How long was the delay?—We had a month allowed us from the date of the order.

3997. How many locks are you behind?—About 100.

3998. Shall you be able to complete your order within the time?—Before.

3999. If you received consecutive orders, should you have any difficulty in going on with them?—No.

4000. Have you improved the manufacture of locks in your time?—I expect I have.

4001. Do you use any machinery for making them?—We always use it.

4002. Do you think that there is room now for making any improvement in the machinery that is used in the manufacture of locks?—Not to any great extent.

4003. Do you think it possible to make locks on the proposed plan; to make the different parts fit into one another?—We can do that as it is.

4004. Do you mean to say that the locks that you now make can be made so nearly alike, that the parts of one will fit the parts of another?—They are made quite near enough for that; it is only occasionally that they are wanted to reverse; I have forged a lock here (*producing the same*), and also a gauge. A good deal has been said about machinery for planing the plates; I mean to say that a man with a file would do it sooner than he could plane it.

4005. Mr. *Dundas.*] Is that plate hand-forged?—It is hand-forged entirely.

4006. Mr. *Muntz.*] You do some by stamping, do you not?—We shall do; we are preparing a stamp for that purpose, and I have one made by Nasmyth; a steam stamp.

4007. Do you contemplate any further reduction in the price in consequence of the stamping process?—Some little, not a vast deal.

4008. Have you any idea of what it will be?—Perhaps 5 per cent. by stamping; not more. Again, I am not aware whether in stamping this tumbler

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(*pointing to the same*), that is made of steel, it will not reduce the quality of the steel; when it is forged, it is not reduced at all.

4009. It will not reduce the quality if it is not over-heated?—I am not aware; that we have to test.

4010. Why should you think that it would reduce the quality?—From the sudden blow.

4011. It is done when quite hot, is it not?—Yes, and if the man overheats it he spoils it.

4012. Did you ever see any injury done to any steel from having a sudden blow at a proper heat?—I have; I have had things stamped made from steel, but that has been done out, not on my own premises.

4013. Did you ever make any complaint at the Ordnance view rooms of the unfair view of the locks?—Repeatedly.

4014. Was any alteration made in consequence?—No.

4015. It remains just the same now, does it?—Just about the same.

4016. Has there been any improvement in the view during the last month?—They are not so strict; they were aware of this investigation, and that has put a check upon them, I suppose.

4017. Mr. *Walpole.*] Since when have they ceased to be so strict?—Since Mr. Lovell's indisposition; the viewers or the inspector ought to send everything back that they see is not good for the service, but they ought not to send things back when there is nothing at all the matter with them; with regard to that lock of mine, I do not care who looks at it.

4018. Mr. *Monsell.*] Have you ever sent any samples of rejected locks to the Board and complained of their rejection?—No.

4019. If you are aggrieved, when there is a court of appeal it would have been better to have appealed, would it not?—Yes, it would have been, and in future I shall always do it.

4020. Mr. *Muntz.*] Is not the person appointed by the Ordnance-office to inspect the work received from the manufacturers, the person to whom the complaint should be made in the first instance?—To be sure.

4021. Is there not another feeling produced among the contractors generally, and among their workmen, that they do not like, if they can possibly avoid it, to make complaints of the viewer, for fear of disputes?—They do not like to do that, because the viewer next time will punish them for it.

4022. The viewer has such discretion in his own mind, that though he does not serve the Ordnance he prejudices the contractors and the workmen?—Yes.

4023. Therefore there is a disinclination ever to make a complaint, unless it is absolutely and indispensably necessary?—Yes.

4024. Mr. *Geach.*] You would bear a very great deal of injury and inconvenience before you would make a complaint?—I have done so, but I would not do so in future.

4025. Mr. *Monsell.*] Will you describe the way in which the view is conducted; is it conducted by jig and gauge?—Yes; I have a gauge here (*producing the same*), exactly the same as they view by.

4026. If every part is tested by jig and gauge, has the viewer any opportunity of exercising his caprice?—Yes.

4027. Will you explain how?—He will pick something out in the gun lock, and then send it back; they chalk it and mark it.

4028. Mr. *Muntz.*] Will he not tell you why?—He may tell you why, and at the same time it is no fault.

4029. Mr. *Monsell.*] Still jigs and gauges are fixed and definite standards?—Yes, they are always attended to; but there is something about a gun lock that the viewer can pick out something to say it is not as it should be in the materials, in the movements of it, and in the different limbs composing that lock.

4030. As to the different limbs of a lock, surely the jig and gauge would prevent any caprice on the part of the viewer?—The jig and gauge he would attend to, of course; but there are other things besides.

4031. Colonel *Lindsay.*] What other things do you allude to?—Particular parts of the work they have viewed, properly speaking, to a hair; and it is quite impossible for a workman to work to this nicety, for all men's fingers are not alike in that respect.

4032. Mr. *Monsell.*] Would not it be an exercise of caprice on the part of the viewer, if he were to pass over anything that the jig and gauge told him he ought

not

not to pass over; if so, there would be different views; one viewer would view in one way, and another in another; if they view by jig and gauge strictly, all the viewers will view alike?—They ought, but they do not; there ought to be some allowance, and not view a thing to a hair's breadth; the generality of men cannot work to this nicety.

4033. Still the terms of the contract are distinctly stated; every inspection is stated distinctly that the locks are to be viewed by easy jig and gauge?—Of course they are; but if you ask any practical man, he will tell you the same as I do.

4034. Mr. *Newdegate.*] There are many different qualities of locks, are there not?—Yes.

4035. What is the difference in price between the different locks that you make; between the dearest and the cheapest?—I have a high price for my best locks, 3*l.* a pair for some, and 3*l.* 16*s.* for others; it depends upon what work there is in them.

4036. Thirty shillings a lock?—Yes.

4037. What is the cheapest lock?—We never trouble ourselves with the common trade; nothing commoner than this (*pointing to the same*); there may be a military lock made at a lower rate, if the Board thinks it good enough for the purpose. Some few years ago there was a lock that they called the extra service lock, which came cheaper; I had nothing to do with that.

4038. What is the price of the present contract lock?—Eight shillings and three pence.

4039. Then what is the difference between the 30*s.* lock and the other lock, which will explain the difference of price?—It is a finer quality; it requires to be filed nicely, and takes more time of the men; we make that better sort of lock, and do not profess to make the others.

4040. The difference is in the filing, and the niceness of the fitting?—In the fine action required and the nice workmanship.

4141. If the viewer viewed too severely, he might render it impossible for any lock to pass that was not worth 30*s.*?—He would pick something out; I should wish any competent judge to look at that lock.

4042. Does not the price at which it is possible to produce the Government lock depend upon the view?—Yes, it depends upon the view, as a matter of course.

4043. If the view was too strict, it would not be possible to produce it at the price?—It cannot be.

4044. In short, the possible production at the price depends upon the view?—Yes.

4045. Mr. *Monsell.*] Have you erected a great deal of machinery yourself?—We are acting at it.

4046. Have you erected any very lately, within the last year or two?—We erected some within the last two years.

4047. Do you make very much more of the different parts of the lock by machinery than before?—No, we have not erected machinery exactly for locks, but for other purposes; we intend to do all that we can by machinery to locks.

4048. Are you satisfied with the results of the machinery, so far as you have tried it?—It is certainly an advantage in using it, I expect. We always have used machinery in making gun locks; we could not get on at all without it.

4049. Mr. *Muntz.*] I suppose you do not pretend that you will ever obtain machines to make locks without hand labour?—Never, unless you put them together like mouse-traps.

4050. You would make a lock that would work for a certain time, but by continued use it will soon wear out?—It would be worth nothing.

4051. Was the lock you have produced exhibited at the Exhibition?—The new line lock was.

4052. Did you get a prize for it?—I did; I got a prize for my things, however, that included. The lock was looked at by the commissioners appointed by Government from Belgium and France, and Mr. Lovell was there also.

4053. Mr. Lovell was one of the commissioners, was he not?—Yes.

4054. Being a commissioner appointed to inspect the locks, he passed all your locks, including this, and awarded you a prize?—Yes; at least I had a prize.

4055. *Chairman.*] How many locks do you make in a year?—We make from 400 to 500 pair of the best locks; we have not made any others than those of the best work till we undertook to do this in the last three years.

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4056. Mr. *Monsell.*] How many Minié rifle locks do you think you could make in your establishment in a year?—I should suppose about 400 or 500 a week.

4057. Supposing you had an order to that extent, for three years from this time, at what price could you make them?—That I should rather consider on, and make a trial of this new machinery before I gave a definite answer to it.

4058. Mr. *Dundas.*] Would you not be inclined, if you had such a large order as that, to put up a good deal of self-acting machinery?—I would, provided I had a sufficient quantity of work to enable me to manufacture without loss to indemnify me in the erection of that machinery. The Honourable Member is aware that those machines, according to their own showing, come very expensive. If this lock was altered, and we do not know what may be produced in this age of invention, and, if anything else came out, those machines would become useless, perhaps.

4059. Mr. *Monsell.*] A good machine would probably repay its cost in a very short time?—I am fearful of that.

4060. Colonel *Boldero.*] Are not the viewers selected by the Board of Ordnance men well qualified and competent to the work that they have to perform?—Yes.

4061. You would not for a moment assert that they would wilfully or intentionally so conduct the view that it would be detrimental to the trade of Birmingham?—Sometimes they would, if you offended them; if you complained of their sending back things that they ought not to, they would punish you.

4062. That is not general?—It may not be, but some have done it.

4063. You are satisfied with the present view, are you not?—Yes.

4064. You would undertake to make 25,000 locks with the present view?—I would.

4065. Mr. *Dundas.*] What imperfection was there in that lock, for which it was cast?—It was chalked in a certain part, which I can point out; as to imperfection, there is none.

4066. Has that lock been altered in any way since it was rejected?—It has not.

4067. You think that that lock was rejected for an imperfection that would not materially affect even one of your high-priced locks?—Not at all.

4068. Colonel *Lindsay.*] Your complaint is rather that you are subjected to the caprice of the viewer than against the principle of the view?—They had certainly very strict orders from Mr. Lovell to take nothing but what was exactly like the pattern in every respect; now those words are what I complain of, because if I send locks to the view, that is, to be approved, if they are sound, and good, and serviceable, if they are not exactly the same weight to a fraction, they ought not to be rejected.

4069. Mr. *Walpole.*] That depends upon your contract, does not it?—There was always some allowance made before Mr. Lovell's time.

4070. Colonel *Lindsay.*] Do you think that this principle could be adopted, that the tradesmen should appoint a viewer and the Government a viewer, and that there should be a Government referee?—Either I or my son look to the locks before they are sent.

4071. Supposing that the contractor had the appointment of a viewer upon his side, and the Government of one on their side, with a Government referee for final decision, and to settle disputes, would that give more satisfaction?—It would be more satisfactory, of course.

4072. Do you think that the Board of Ordnance, as a Board, can have any object in pursuing a system which prevents them obtaining the supply they require?—It has prevented them, most certainly.

4073. Should you say that the Board had any object in upholding a system which prevents them from obtaining a supply?—I should say not.

4074. As to the strictness of the view, you would not complain of that?—Not now.

4075. You would consider it the duty of the Government to put the best possible article into the hands of the soldier, would you not?—It is their duty to have nothing but what is good, sound, and perfect.

4076. Would it be possible for one contractor to contract with the Government for the supply of the entire arm?—I should say that it is best as it is, by all means.

4077. Mr. *Muntz.*] Trade at Wolverhampton is very good, is it not?—It is.

4078. And has been so for the last three years?—Yes.

4079. Are the manufacturers very well employed?—Yes.

4080. If your gun lock-makers find the view of the Government vexatious, and find their rights, interests, and wages interfered with by the vexatious viewing, I presume you find great difficulty in getting them to make locks at all?—Yes; a man who can file gun locks can file amost anything else.

4081. If there was a fair price given for the work, and you wanted to increase the amount of your work, if the view was fair towards man and master, you would have no difficulty, you think, in obtaining any quantity of labour that you wanted?—No.

4082. Lord *Seymour.*] You have referred to the difficulty of the view, as the reason why you could not complete the order?—No; the first reason why there was any delay with this present order was, that it was a new thing; swivel locks are locks that the generality of the workmen were unacquainted with, and we had great difficulty in getting them into the way of it.

4083. When was that order given to you?—October the 6th, 1853.

4084. In your letter of the 16th of January, you state that the delay in the supply was caused by the unwillingness of the men, and their refusing to make the locks at the price?—There was an unwillingness, and a sort of strike for a short time, but it did not continue long.

4085. Do you attribute that to its being a new lock that they had not been accustomed to make?—Yes.

4086. After a short time that difficulty was got over?—Yes; it was on my part, however.

4087. What is the price of the best gun lock that you manufacture?—£.3 is the best price for the best double gun locks, and 3 *l.* 16 *s.* for double rifles, right and left.

4088. For a pair of locks?—Yes.

4089. Mr. *Dundas.*] Is that when they are entirely finished, or merely off the file?—They are filed; the cocks are not put on till after the gun is screwed together.

4090. Lord *Seymour.*] Have you made locks for the East India Company?—Yes, I have done so.

4091. What priced locks do you make for them?—They make two sorts, and I have made swivel locks for them since the year 1843 for their rifles; and for their muskets they use what we call the hook-lock.

4092. Since 1843 they have had swivel locks?—Yes, to all the rifles; and I made patterns to the musket locks when they began to make the guns for percussion, and also swivel the locks.

4093. What has been the price at which you have supplied them?—That has depended upon the orders and the state of the trade when their orders were sent. We have not done anything for them for several years.

4094. Was the lock that you made for the East India Company an inferior lock to the lock that you made for the Ordnance?—No, I did not consider it inferior; it is inferior to the present lock; their musket lock is, not the other.

4095. Is the rifle look equally good?—It is.

4096. Mr. *Dundas.*] You stated that the rifle locks were rather more expensive than the fowling-piece lock; in what is it different?—We generally put bolts to the rifle locks to hold the lock at half cock; also there is a slide in the tumblers; they are required to come off very fine at the last bent, and this slide covers the middle bent, so that it shall not catch at half cock.

4097. Mr. *Newdegate.*] You have stated that you think some additional security should be taken against the abuse of the view?—If they should be so litigious.

4098. You wish for an alteration of the present system in that respect?—I have no reason to complain myself, so far as I am concerned; with the present view we have scarcely any ever rejected.

4099. That has been within the last few months?—Yes.

4100. Is it not your opinion that some security should be taken for the regularity of the view?—I think it would be quite as well.

4101. You have been in the habit of supplying the private trade to a great extent with locks, have you not?—I have; not in the common way of work.

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4102. But with locks?—Yes.

4103. Have you found that they have been so vexatious and litigious with you as the viewers during Mr. Lovell's time?—No.

4104. If they had been, you could not have conducted your business?—I should have been hampered by it, of course.

4105. What is your objection to the system of one contractor becoming responsible for the complete musket?—I should say that he is best out of it.

4106. On account of the contractor himself?—Yes.

4107. Do not you think that he would perhaps be as good a referee as you could have in cases of difficulty with the Government viewers?—There may be something in that; I should say that he might, if he was a good judge; it is not every gunmaker that is a judge.

4108. Mr. *Muntz.*] Have you ever made locks for the East India Company?—Yes.

4109. Have you made many?—Yes, a great quantity.

4110. How were those viewed?—They were viewed differently to what they were viewed in Mr Lovell's time.

4111. Were they as good as those supplied to the Government?—Yes.

4112. At what price did you make them?—Somewhere about the same; that depended entirely upon the demand, and how the trade was.

4113. Supposing the trade was the same?—If there was the same trade, they were the same.

4114. You think that the view of the East India Company's lock is quite sufficient for the purpose, do you not?—Yes.

4115. Does it ensure a good article?—Yes; the locks were very serviceable locks.

4116. Have you found any difference in the contracts in consequence of the tendering system being introduced?—After the tendering system, which I believe made its appearance in 1849, the view was much more strict.

4117. Was there the same viewer, or a new one?—The same viewers.

4118. Have you any idea why the view was more strict?—Of course they were obliged to view by the orders from the superintendent; the written orders that were given to them.

4119. Did you ever see any written orders?—Yes, I saw one once.

4120. Was there anything in it peculiar?—It went to the strict letter of the law, that the articles must be exactly like the pattern.

4121. And without having any pattern?—Yes, without having any pattern or guide whatever.

4122. It came to this, did it not, that the viewer, having no limit and no latitude, had only to say that the lock was not so good as it ought to be, and to reject it?—Yes.

4123. If he was out of temper, or had taken a little drink, he might do so?—He was sure to punish you.

4124. Colonel *Boldero.*] He pointed out the part of the lock that was defective, did he not?—He does not give himself the trouble to point it out; they are bundled into a basket chalked, and you must fetch them away.

4125. Colonel *Dunne.*] When he chalks them, does not he chalk the part that he objects to?—Yes, precisely.

4126. You state that the view became more strict after the tender system was introduced than it was before?—It became much more so.

4127. Was not the reason of that this, that there were many contractors of an inferior class who undertook the contracts?—I am not aware that that was the reason, because it was the same with every one, let him be ever so respectable.

4128. You state that they acted according to their instructions, without the power of deviation?—Yes.

4129. Suppose that the viewer had a power of deviation, where would it end; he must obey the orders, or he must have entire liberty?—Yes.

4130. How can you make the distinction?—An allowance ought to be made as to the viewer's authority to reject locks. If he sees anything bad he ought to send it back; but if it is not exactly up to the gauges in some of the different parts of the lock, and the least deviation from the pattern lock does not make it

it a bit the worse for service; no man, scarcely even a practical man, could tell the difference.

4131. Would not the fault of that be in the orders given by the Board, and not in the viewers following strictly the orders that they receive?—Yes, of course.

4132. If you allowed a deviation from the pattern, would you leave it to the viewer to decide how far that was to go?—If carried too far, by all means reject the locks.

4133. How are you to determine when a lock differs too much from the pattern?—Any man of judgment could tell.

4134. Are the viewers men of judgment sufficient to tell?—I should think so.

4135. Mr. *Walpole.*] Would it not leave it open too much to caprice if the viewer had to decide upon the extent of deviation to be allowed?—Yes. If he carried it too far he should not be allowed to do it.

4136. It would be safer for the contractor to have his work tested by some stated gauge rather than by the caprice of the viewer, would it not?—Yes.

4137. Colonel *Dunne.*] Would it not be satisfactory if there was some power of appeal, when work was rejected by the viewer, to the Board of Ordnance, who might accept the work as sufficient?—I think tnat would be a very good plan.

4138. Mr. *Muntz.*] Have you ever had locks returned to you as faulty when you could not possibly find out what was the matter with them?—I have had something to do to find it out. If this lock ha d not been chalked I should not have known what it came back for. I handed it round to my principal workmen, and they cried shame on it, and that it should not have been rejected.

4139. The effect of such a rejection is to dissatisfy the workmen, and make them not attend to that branch of the trade?—Yes, it has driven several men from the trade altogether, and they will not make any more. Some of my men have left entirely and gone to other things, and they say that they will not make another lock.

4140. Is not this the result of that, that it makes the locks dearer than they would be with a fair view?—Yes.

4141. Mr. *Monsell.*] If so, how does it come to pass that the East India Company's locks are the same price as the Government locks?—It depends upon the demand.

4142. There is a less strict view on the part of the East India Company, is there not?—As I may term it, they have more sense of justice about them.

4143. Having more sense of justice about them, why do they not get the article cheaper, having a less strict view?—I do not know for that; it depends upon circumstances. They will take care that they do not give too much.

4144. Mr. *Newdegate.*] Although the East India Company have not got their work done cheaper, they have been more regularly supplied?—Yes, till within the last few years.

4145. They have gained by being more reasonable in the view?—Yes, the trade would sooner supply them, as a matter of course.

4146. Mr. *Geach.*] With regard to the trade being thrown open, what was the system before the trade was thrown open?—A certain price was fixed for the the lock by Mr. Lovell, I believe.

4147. There were certain persons only who could be employed, were there not?—Yes.

4148. Those persons were admitted as proper persons to supply the Government?—Yes; according to the best of his judgment; whether there was any favour in it I cannot say.

4149. You know, do you not, that for a long time a man continued to be a Government contractor; he remained so for a series of years?—Yes.

4150. Perhaps you recollect Mr. Adams, who was a gun maker in Birmingham?—Yes, I knew him well.

4151. Do you know that he continued to be a Government contractor for a great number of years?—I believe he did.

4152. And he did not make a gun himself?—I cannot answer as to that.

4153. You know, I presume, that many of the contractors went to other people to obtain the articles?—I believe they did.

4154. Therefore there was the same necessity for strictness of view as when the thing was really thrown open?—Yes.

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4155. Before the introduction of the present system the Government contractors went to those various manufacturers to get the work done, instead of the Government going directly?—Yes; but observe this, that percussion locks are different from the flint locks; when those were used they were made of a very inferior description to what guns are made now.

4156. Lord *Seymour*.] Would this lock that was rejected pass all the gauges that it had to pass?—Yes.

4157. Then its not meeting the requirements of the gauge was not the cause of its rejection?—Not at all.

4158. Do you mean that you do not object to the test by gauge?—Yes.

4159. You would be willing, when a lock sent to the Ordnance did not meet all the requirements of the gauge, that it should be rejected?—Yes; if it is too light it should be rejected, or if it is too heavy it should be rejected; but at the same time it ought not to be viewed to a hair's breadth.

4160. It ought not to fit the gauge to a hair's breadth?—Not exactly, because it cannot possibly be the better or the worse for it; the principal part in gun locks is to have them fitted well, good action, and good bents.

4161. Have you any other locks that have been rejected?—No; I have kept that lock as a curiosity since the year 1850.

4162. Mr. *Geach*.] To show the system?—Yes, to show it up; it is time that it was shown up.

4163. Mr. *Walpole*.] You stated, did you not, that some locks which you had furnished to the Board of Ordnance had been subsequently accepted after they had been rejected?—Yes, that has frequently been the case.

4164. Has it happened frequently?—It used to be common enough when I had contracts before 1850.

4165. Since the year 1850, has it happened constantly?—I have not had any contract since 1850, till this last one in last October; I was so disgusted with the system of inspection, that I did not think it worth my while to trouble myself with it.

4166. You stated, did you not, that you were satisfied with the inspection which has taken place since your last contract?—Yes.

4167. Your evidence as to the way in which the Board of Ordnance had returned locks and afterwards accepted them, applied to a preceding period, and not to the present system of view?—Yes.

4168. So far as you know, is the present system conducted in such a manner that you think it probable that some of the rejected locks would be accepted again, if you or any other contractor subsequently returned them?—I should say that they would.

4169. That has not happened in your own experience?—No.

4170. Are you aware that it has taken place with any of your friends?—I am not.

4171. Are the orders to the viewers the same now as they were in former times?—I am not aware whether they have the same instructions or not; I cannot answer to that.

4172. The view is not so strict, is it?—No, not so strict as when Mr. Lovell was the superintendent.

4173. Lord *Seymour*.] Do you make any locks for the American market?—No; I send a few over of the best description of locks.

4174. You do not make any cheap ones?—No.

4175. Mr. *Muntz*.] You made locks once that were sent to Enfield?—Yes.

4176. Was there any difference in the view there?—They were fair there.

4177. There was a difference between the Birmingham view and the Enfield view?—Yes.

4178. How do you account for that?—I do not know; they sent them back at Birmingham when then they did not do so at Enfield.

4179. At head quarters they received your locks?—Yes, and at the Tower also.

4180. Birmingham was the evil place?—Yes.

4181. Now the view is reasonable, and well conducted, is it not?—Yes, it is very fair; I should be sorry to send anything but what I thought was perfectly sound and serviceable, and I have no doubt the others would do the same.

Mr. *William Scott*, called in; and Examined.

4182. Mr. *Muntz*.] ARE you resident in Birmingham?—Yes.

4183. What occupation are you?—A gun maker.

4184. How long have you been in that trade?—Thirty years.

4185. Were you ever a viewer in the service of the Board of Ordnance?—Yes.

4186. How long ago?—In the year 1838.

4187. Why did you leave the service of the Ordnance?—I left to take the management of Mr. Potts's business in London.

4188. Have you ever been employed by the Board as a contractor for setting up small arms?—Yes; I was employed from the year 1843.

4189. Up to what time?—Up to 1851.

4190. For setting up?—Yes.

4191. Have you ever applied any machinery to the work?—Yes; in the year 1850 we attempted to make the stocking machine applicable to the stocking and screwing together of a gun.

4192. Did you succeed?—We tried over the space of the whole of that order without coming to any very satisfactory result, at considerable cost and loss, and we did not derive any decided advantage; but we thought it would be wiser, if possible, to make machinery applicable to do so, for the sake of facilitating the progress of the work.

4193. In your opinion, do you think that it could be applied with advantage?—From that time to this I have not had an opportunity of carrying out my experiments, as the Board of Ordnance have not furnished me with any further orders to enable me to do it. I was entirely, or almost altogether, dependent upon them for such work.

4194. What do you think has been the cause of the delay in producing arms, which is complained of by the Board of Ordnance?—The cause of the present delay is the fact that they have closed many of our manufactories by not issuing their orders; for instance, since 1851, I, amongst others, have had nothing at all to do for my men; the vices, the benches, the machinery, and rifling machines are lying idle.

4195. The complaint that there are no men at work upon guns is not the fact, is it?—I have seen men often about the London Docks and wharves, scores of them, almost shoeless and stockingless, and in a state of destitution and starving, and seeking labour and occupation elsewhere.

4196. Do you mean men who had before worked in London or Birmingham?—Those were men that worked in London three years ago.

4197. Now they are employed, are they not?—Some are employed in their own trade, and others are employed variously, as they can find something to do. I do not consider that the whole of them, or anything like the whole of them, are employed at the present time.

4198. They have been so used to the gun trade that they have not obtained work in any other quarter?—That is to say, they have not had permanent employment.

4199. What plan do you think would be best to obtain a large supply of arms in a short space of time?—By setting us on to do it, those men who are competent and capable of doing parts of the work, and we should be in a position to supply a very large quantity of arms. I consider that the Board of Ordnance have lost at least a supply of 150,000 stand of arms in the last three or four years, in consequence of not employing those parties who are ready and willing to do the work.

4200. Are you aware that any large number of men have been at different periods quite out of work for weeks together?—Yes, in London especially. I stopped in London, hoping that something in the shape of work would come, by which I might employ my men, and find a use for the manufactory and its appurtenances, and after a long time, nearly two years, the thing was all taken down to Birmingham, and I being entirely dependent upon this work, as a matter of policy considered it my duty to follow the work to Birmingham, in hopes that I might there find something to engage my attention profitably; therefore I was not in a position to judge whether the men in Birmingham were

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unemployed or not. In London I know that they were not generally employed.

4201. Are you aware what was the cause of the London people remaining unemployed when there was such a demand for arms?—I do not know; so far as the then supplies were concerned, I believe the whole went down to Birmingham, there being nothing for them to do. I know that repeated applications had been made to the Board for something to do; and as repeatedly we got a negative answer.

4202. Do you know the cause of that?—No.

4203. Did you hear that the Birmingham tenders were lower than yours?—I believe some of them were.

4204. To what extent?—I think 1*s.* 6*d.* a gun. I believe that the tender for setting up the Minié rifle was taken in Birmingham at 1*s.* 6*d.* per gun less than I tendered for.

4205. Then the supply of a very pressing demand for arms depended upon 1*s.* 6*d.* a gun?—It appeared like it.

4206. Are you aware what the number of workmen is in London who are employed at the gun trade?—Not precisely; but when I remember that in one year alone there were something like 96,000 guns made for the Board of Ordnance and the East India Company, all of them viewed in the same strict way that they are subjected to; when I remember that those guns were all produced in one year, that at once gives the idea that there must have been a large proportion of men employed. I think that was in 1848 or 1849.

4207. Mr. *Monsell.*] What sort of guns were they?—Muskets for the Ordnance and the East India Company.

4208. Were they first quality muskets?—I think the bulk of them were. I think they were all; I do not know that there were any extra service; I cannot say positively.

4209. Mr. *Muntz.*] How many houses in the gun trade are there that manufacture in London?—I should think there are about 16 that have been in the habit of making for the Government and the East India Company.

4210. Are you aware as to the state of their orders now?—I think they are doing nothing at all.

4211. Do you think that if the Government wanted 100,000 guns next year made in London, they could be made?—I do not think that they could make 100,000 of those Minié rifles in one year in London, but a very large proportion.

4212. Could they make them in the second year?—No doubt of it.

4213. Have any of those Minié rifles been made in London?—Not to my knowledge.

4214. *Chairman.*] At what price could they be made?—Judging from the pattern that I have seen, which is one of the most admirable guns that I ever did see for military purposes, and most beautiful in every respect, both in its construction and workmanship, I do not think that they could be made for less than from 3*l.* 5*s.* to 3*l.* 12*s.*

4215. For even so large a number as 100,000?—I have not entered into that calculation; but that would make an important difference if the gun makers employed upon those arms could have a continuation of work to go on with. The fact of remitting the work one month or six months, and for all the hands to do none for six or 12 months afterwards, or three years, makes all the difference, as an establishment is almost abolished in the time. In my case it was almost perfect ruin to me.

4216. Mr. *Monsell.*] It takes a long time to get the men together again, does it not?—I do not think that I should have any difficulty in getting a number of men capable of doing all the work, if they were sure that there would be occupation for them; many of them are in different parts of the country in different occupations, but they would gladly come back if they could find occupation in my manufactory.

4217. In what year was it that the 96,000 muskets were produced?—I think in 1848 or 1849.

4218. In 1848 there were 11,455 produced for the Ordnance in London, and in 1849, 11,458; did the East India Company take 80,000 in each of those years?—I mean all descriptions of arms; I know that about that time this number of guns was made, and I think that there are parties here who really have the evidence, who can give it exactly.

4219. Mr. *Newdegate.*] Speaking of those arms, you do not confine yourself to one description alone?—No, every description.

4220. You include all qualities, the line gun, the extra service, and sea service?—Yes, constabulary, artillery, and pistols. I suppose that some pistols entered into the account in a small measure.

4221. Mr. *Monsell.*] Do you recollect what your tender was in 1851, for setting up the new rifle musket?—Twenty-five shillings.

4222. Are you sure that it was not 27*s.*?—It was 25*s.* to the best of my belief; I am sure that it was not 27 *s.*, it was 25 *s.*

4223. Colonel *Dunne.*] You were a viewer at one time, were you not?—Yes.

4224. From whom did you receive the instructions by which you viewed?—From the then master furbisher, Mr. Manton.

4225. Did you consider that those instructions were so strict as to be vexatious to the trade?—In the time of Mr. Manton, I did not think them so very severe; they certainly were severe, but there was not very much to complain of.

4226. Were they severer than the necessity which existed of obtaining proper arms for the Government actually required?—I had no positively written instructions; I was placed in the view-room after having made a gun before them, and then having been considered a practical man, I was placed there with a pattern before me, and some sort of statement as to what they required to be viewed in my position. I then, till I left, acted according to my own judgment in all cases; I gave entire satisfaction, and I believe that I was not unnecessarily severe with the men.

4227. Were you a viewer under Mr. Lovell?—For a very little time.

4228. Did he give you more stringent instructions than Mr. Manton, or did he oblige you to be more severe?—He did not.

4229. You were only a short time with him?—Yes.

4230. You spoke of the contracts being given to the Birmingham manufacturers rather than to the London manufacturers; were those contracts given to them solely on account of the tenders from Birmingham being lower?—I should think so.

4231. Are you aware of the rule by which the Ordnance invite tenders?—They state that they are not bound to give to the lowest tender; but in each case, so far as I have been concerned, I have generally understood that it has been given to the lowest.

4232. Are not they given in this way: they issue a notice for a contract, and when the tenders are received, are they not then referred to an officer to ascertain the competency of the parties tendering, and is it not the invariable rule to give the contract to the persons making the lowest tender, if reported competent by the officer?—It is so stated, but I believe it has never been so conducted; because the parties tendering, who have received the work, have generally been known to the inspectors, who are competent persons to judge whether they are capable of doing the work or not, and they have taken it for granted that they were capable.

4233. Suppose the Board of Ordnance received tenders from equally competent persons in London and Birmingham, were they not bound to give the contract to any person tendering if he was the lowest, even by so small a sum as 1*s.* 6*d.* a gun?—I do not think that there was any particular hardship, as we understood that if our tenders were higher than others we should not have a chance of getting them.

4234. Have you had any contracts with the Board of Ordnance yourself?—Yes, I have made a very large quantity of guns for them.

4235. Did you find the view vexatious to you?—Occasionally, very.

4236. More vexatious than when you were a viewer?—Certainly.

4237. Mr. *Muntz.*] Will you take that paper into your hand (*handing the same to the Witness*); is that the tender that you sent to the Board of Ordnance?—No, it is not.

4238. Is not that your name?—No; that is "W. & C. Scott."

4239. Lord *Seymour.*] You stated that you tendered in 1850?—Yes.

4240. Was any opportunity given you for tendering in 1853?—None at all; not for setting up the guns; not to my knowledge; I do not recollect any contract in 1853.

4241. Were you prepared to have undertaken any work if the opportunity had been given to you?—I applied two or three times, certainly more than once,

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for work, and on the 14th of November I received an answer from the Board to the letter which I sent in: I had sent one or two before, which I have not here, but this is the answer to a letter making application for work, in which they say they are not at present requiring my services (*producing the same*).

4242. When was that?—On the 14th of November 1853.

4243. Mr. *Newdegate.*] Will you just read that letter?—I would just add, before reading that letter, that I had taken in a partner who was also a London gun-maker, and it is therefore addressed to us: "Gentlemen,—In reply to your letter of the 24th ultimo, stating your readiness to supply this department with materials, &c. for small arms, I am directed by the Board to acquaint you that at present they are not in want of the articles you offer to supply..'

4244. Mr. *Muntz.*] That was last November, was it not?—Yes; and since then I have also applied again. This letter was written to acquaint the Board that I had taken in Mr. Cook as a partner; I referred in that letter to what we had done separately in London, and that we had a manufactory in Birmingham, and were willing to work for them, and requested to have something to do, and that was the answer to the letter. Then I again wrote a little time back, stating my readiness to serve them, believing that the circumstances of the war that was impending justified me in a second application in the same terms; and in reply to that letter, they kindly say, "in reference to your letter, dated the 13th instant, offering to supply guns and gun-stocks, I am directed by the Board of Ordnance to acquaint you that they do not at present require your assistance." This was on the 17th of February 1854.

4245. Mr. *Monsell.*] Supposing the Board had no materials to be set up, obviously they could not require setters-up?—Of course not; I supposed that they had some 60,000 sets of line materials by them, and that made me apply.

4246. Colonel *Lindsay.*] You stated that the manufactories were closed for want of orders?—Yes.

4247. And that the Board of Ordnance had lost 150,000 stand of arms in consequence of not having given orders for the last three years?—I think so.

4248. Have not the last two or three years, with regard to the supply of arms for the Board of Ordnance, been a state of transition?—I believe they have.

4249. Then would it have been wise for any Government to give large orders either to the Birmingham or to the London makers for 150,000 stand of arms, when the pattern itself at that time was not decided upon?—I am not prepared to say that it would, except that they might have kept us employed by setting up the materials that they had then in store, and so enabling us to keep our machinery bright, and our men ready to work at any given time. If we had only had a very small portion to supply them with, it would have assisted us greatly.

4250. Do you know what was in store at the time?—Not exactly. I have some idea that there must have been a good many materials.

4251. Were the materials for the Minié rifles in the store at the time that you speak of?—I think not.

4252. So far as the London gun-making trade is concerned, is it not the fact that Lord Hardinge offered the rifle to competition among the London gun-makers?—I have not heard of it.

4253. For the purpose of making experiments?—I believe it was thrown open to the London trade, that is to say, they were called upon to send in patterns and specimens.

4254. Are you aware that, so far as experiments were concerned, the Enfield rifle beat them all?—Yes, I believe so; so far as I know of it.

4255. Mr. *Muntz.*] The Enfield rifle made by the Government would have been to the pattern that had been ordered, would it not?—Yes.

4256. Was the pattern at last decided upon from the experiments of any gun-maker?—No.

4257. Was it not taken from the experiments made at Enfield?—Yes; it was a combination of all the good things that had been introduced.

4258. When was the pattern of the Minié rifle first determined to be made use of?—I cannot say; I think not very long ago. I think that it has not been determined upon more than six weeks.

4259. But the first pattern I allude to?—I do not know.

4260. It has been stated that there were no materials to use. Supposing the Board

Board of Ordnance had advertised for tenders for a certain quantity of arms to be supplied consecutively when that pattern was once fixed upon, so that each manufacturer might have had a consecutive quantity of work, would there have been any deficiency in manufacturing materials to any extent?—No, not if they took reasonable means to obtain them.

4261. You have seen some of those pistols of Colonel Colt's, have you not?—Yes.

4262. What do you think of them?—It is to a great extent a very useful and efficient weapon, but at the same time it is a very clumsy one.

4263. What do you think of the style of work in them compared with the Minié rifle now making?—Compared with the Minié rifle there is no comparison; the Minié rifle is in every sense of the word a splendid gun in point of workmanship. I look upon Colonel Colt's pistol as anything but that.

4264. Do you mean to say that the workmanship in Colonel Colt's pistol is not by any means a perfect piece of work?—Certainly not; I consider the barrel good and the cylinder good. I consider the construction of the lock inferior, and as to the other part of the pistol, it is perfectly common.

4265. The workmanship is not preferable?—No.

4266. What is your opinion of the statement, that a quantity of materials may be thrown into a basket, and taken out and fitted indiscriminately?—I know that they would not go together again.

4267. Have you ever tried them?—Yes, I have; I happened to have two pistols of Colonel Colt's at home, and I simply tried to reverse the rods, as being the nearest thing at hand, and I found that I could not do so; they would not act.

4268. Do you think, with your knowledge of gun-making, that it is possible by any machinery, in any reasonable time, and at any reasonable expense, to make gun materials which shall so fit into one another perfectly without a great deal of manual labour?—Certainly not; by no means; it is impossible.

4269. Do you think that the present pistols of Colonel Colt's are put together without manual labour?—Certainly not.

4270. Did you ever see an American musket?—No; I have heard a great deal about them, and of the machinery that is spoken of so highly as being applicable to them; but I want to know, if they have this marvellous machinery, why they do not turn to it and do all their work at home with it, and not only so, but come forward and compete with London and Birmingham.

4271. If a gun can be made by the American process, as has been stated, for 20*s*., and only 10 per cent. paid for the importation of it, that would not allow our makers to obtain 3*l*. for the same gun, would it?—Certainly not.

4272. You have never seen one of those American guns made?—No.

4273. Lord *Seymour*.] Do you make guns for the East India Company?—No; I was confined to the Board of Ordnance.

4274. Since you discontinued to make for the Board of Ordnance, have you made none at all?—Very few; they have been all fowling-pieces.

4275. You stated that you were a viewer formerly?—Yes.

4276. When did you cease to be a viewer?—It was either in 1840 or 1841; I think it was in 1841.

4277. How long were you a viewer?—A little over two years.

4278. Were you a viewer at Enfield, or at Birmingham?—At the Tower of London.

4279. What parts of the musket did you view?—I viewed after the barrels and locks were sent to the gun-makers. I viewed the gun in every branch; we have a number of branches; for instance, the stocking is a branch; what we call the screwing together is usually called a branch; then percussioning and making off and finishing the barrel, and the browning, all those are different branches as connected with the setting up of small arms. I used to view the gun in all those stages.

4280. You viewed the gun several times, did you not?—Yes, five or six or seven times, besides filling up my time in viewing implements.

4281. Did it often happen, when you rejected a part of a gun, that an appeal was made to the inspector?—In my time I do not think that ever happened. I do not remember it. I never rejected the thing unless it was fairly rejected. There is a certain discretionary power that ought to be in the hands of competent men to view the Government work, and then if they were men whose minds

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were properly directed, there would be no difficulty about getting the Ordnance well supplied.

4282. When you rejected as a viewer, were there any complaints of your rejection?—I have heard of none.

4283. Was there no appeal, so far as you remember, to the inspector, of your rejections?—No.

4284. Colonel *Lindsay.*] Are you acquainted at all with Mr. Greener?—Yes, I know him.

4285. He is a gun-maker, is he not?—Yes, a gun-maker; a fowling-piece maker.

4286. He is a person who enjoys considerable reputation, is he not?—Yes.

4287. Is he a person upon whose testimony the gun-making trade might have some reliance?—In what respect?

4288. As to his opinion of the manufacture of arms in general?—Yes, I think that I should be ready to take his opinion. I know enough of him to say that I would take his opinion.

4289. Are you aware that, about eight years ago, he published a work on the science of gunnery?—I have not seen it.

4290. Do you agree in this opinion: "A striking advantage gained by the extended use of machinery in making the different parts of the rifle, is the perfect uniformity of the work. So accurately, and in so many different ways, is every part, even the most minute, gauged, that in putting together the whole, no delay is occasioned from trifling inaccuracies in fitting. Each screw, spring, sight, top-board, or any other piece whatever, is so nicely wrought, that it may be applied to and will fit any one of the 3,000 rifles made in the course of the year, as exactly as it does the one of which it finally forms a part"?—I do not believe it.

4291. Mr. *Monsell.*] You stated, did you not, that you set up some machinery for stocking guns?—Yes, I tried that.

4292. Did I understand you to say that that machinery had ever actually been brought into operation?—Yes; I can show the Committee 200 or 300 gun-stocks, which I think we then brought it to bear upon.

4293. Have you read Mr. Whitworth's account of the stocking machine that he saw in America?—I have not.

4294. You are not aware whether your stocking machinery is nearly the same as that which is used in the American gun manufacture?—No; the Committee are well aware of the talent displayed by Mr. Jordan in patent carving here by machinery, about which so much noise has been made in the world, to which very great merit attaches. I had a great many interviews with Mr. Jordan upon this question, and he undertook, he being a good machinist and a good mechanic, to stock those guns by machinery; we found that his then existing machines and tools were not in every sense adequate to the task; many improvements were added, much expense was gone to, and we stopped the operation at the time my employment ceased. All that ceased, and from that time I have not had the chance of trying it, and I do not know what its probable results might have been.

4295. Is that in Birmingham, or in London?—In London; just over the water.

4296. Mr. *Newdegate.*] You have been a viewer, have you not?—Yes.

4297. When you say that discretion should be left to the viewer as to the quality of the work, is there not almost as much difference between the work of a first rate gun lock and a very cheap one, as between a common watch and a chronometer?—Yes; there is that difference between a common lock and a first-rate lock, certainly.

4298. Speaking of the workmanship of a gun, the price is purely the representative of the degree of perfection in the work?—Yes.

4299. And therefore, in fact, the possibility of producing it at a certain price by the trade must depend upon the judgment and discretion of the viewers?—Yes, no doubt of it.

4300. If there is any abuse of it, the trade must suffer, and the supply decrease?—Yes.

4301. Do you know whether, if a gentleman orders a pair of fowling-pieces to fit all round, the price is not greatly enhanced above what the cost would be

if

if they were not made to fit all round?—Certainly, it is advanced very considerably.

4302. If you were to make some thousands to fit all round, of course it would be an enormous increase upon that quantity?—It would be a great increase.

4303. So far as you know of the application of machinery, do you think that it can be brought to accomplish that great object?—I do not.

4304. Colonel *Lindsay.*] What would be the difference in price between a pair of guns ordered in the usual way, and a pair ordered to fit all round?—It would depend entirely upon the quality of the gun; suppose a gun to be worth 20 *l.* in every sense of the word, it would increase the price some 3 *l.* or 4 *l.*

4305. Mr. *Walpole.*] Twenty per cent.?—Quite so.

4306. Mr. *Monsell* (*to Mr. Brazier*).] You have produced a lock which you exhibited at the Great Exhibition, and you mentioned that it had been rejected by one of the viewers?—Yes.

4307. Did you show the lock which you produced to Mr. Lovell?—I did not.

4308. Did you send it to the Board of Ordnance?—I did not.

4309. Lord *Seymour.*] Did you ever, when you had to complain of the strictness of the view, appeal from the viewer to the inspector?—I did not; because I was so much displeased with their method of doing it that I was heedless about it.

4310. You considered that an appeal would have been useless?—I did indeed, because Mr. Lovell always took sides with the viewer.

4311. How do you know that?—I heard so from others who had appealed.

4312. That he had always done so?—Yes; in a general way, he would not have his viewers complained of.

4313. (*To Mr. Scott.*) Were the stocks which are lying before you made by your machinery?—Yes, so far as we got; this is just where we stopped. If you compare this with the finished musket that is before the Committee, there is an immense deal of hand labour required to do it.

4314. Lord *Seymour.*] You did not propose with your machinery to advance further than that?—We calculated in the beginning that we should be able to stock them, but we found that we were very much mistaken.

4315. Having taken up this subject, had you not any curiosity to know what they had been doing in America in a similar way?—I had heard several contradictory statements, and there was no prospect of being paid for it under the circumstances.

4316. Do you think, so far as you have advanced in stocking by machinery, that if you had a large order even that incomplete process would have saved a considerable sum of money?—It saved very little, so far as we went, to the best of my memory; I think it was 1 *s.* 9 *d.* for doing it so far, and we could do it by hand much better for 1 *s.* 9 *d.* I will not say positively that it was 1 *s.* 9 *d.*, but I think it was. I know so far as we have gone that hand labour was cheaper, but I am not prepared to say that we should not have succeeded better if we had had a chance.

4317. Mr. *Muntz.*] Did you find it requisite, as far as machinery had gone, to have a larger stock originally?—Yes, they were all larger; these were very much reduced.

4318. (*To Mr. Prosser.*) Did you learn what those stocks cost in the manufacture?—No.

4319. With regard to the two little figures before you, did you learn what the comparative cost was?—This is in the rough (*pointing to the same*); this is what the machine does, and the cost of it is 7 *s.*

4320. Mr. *Dundas.*] How was that done?—By Jordan's machine; the additional price for finishing the other was 10 *s.*, and the cost price of it is 21 *s.* The work is done by a revolving tool; it is very simple.

Lunæ, 27° *die Martii*, 1854.

MEMBERS PRESENT.

Sir W. Molesworth.	Lord Seymour.
Colonel Boldero.	Mr. Muntz.
Mr. G. Dundas.	Mr. Monsell.
Mr. Newdegate.	Colonel Lindsay.
Colonel Dunne.	Mr. Geach.
Mr. Walpole.	Lord Paget.

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Lieutenant-Colonel *Alexander Gordon*, called in; and Examined.

Lieut.-Colonel *Alexander Gordon.*

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4321. Mr. *Monsell.*] YOU are in the army?—I am a Lieutenant-colonel in the army.

4322. Have you been a member of the committee of small arms at Woolwich?—Yes, and of the sub-committee for carrying on experiments.

4323. How long have you been a member of that committee?—For about two years, since the question of the introduction of new arms has been taken up.

4324. Have you been lately in Belgium?—Yes.

4325. For what purpose did you go there?—I was sent by Lord Raglan to examine the Government establishment of small arms in Belgium.

4326. What places did you visit?—Some of the manufactories at Liege; I visited the Government establishment, and a private one of Messrs. ——.

4327. When was the Government manufactory established?—In 1840.

4328. Can you state why it was established?—In consequence of disputes with the contractors about the supply of arms. Up to the year 1837, they had their arms by contract; and there were so many disputes about the time of the delivery, and the price, and the uncertainty, that they made an experiment in 1837, in an establishment which they hired for the purpose of making arms themselves, and in three years the result was so satisfactory that in 1840 they built the present establishment, which has recently been enlarged, because it is found to work so advantageously to the State.

4329. You have stated that the Government establishment was erected on account of disputes between the Government and the contractors?—Yes.

4330. Do you know precisely what the nature of those disputes was; had they any reference to the strictness of the view?—That was one thing which was stated, as to the view; the contractors complained of the strict view.

4331. Was there a difficulty in obtaining the necessary supplies?—That was one difficulty. I do not know as to the actual delays; that was one reason, the uncertainty of the supply. If the manufacturer had other demands for other countries; and in Liege they make guns for other countries to a great extent; if that was so, and the Government wanted them, the manufacturer was obliged to attend to his first order first.

4332. The irregularity of the supply was one of the reasons, was it not?—Yes.

4333. Did you understand the view which the Government entertained with regard to the state of the gun trade generally in Belgium?—Yes; the gun trade in Belgium had made no progress for 30 years, and they hoped to improve the gun trade by having a manufactory in which they could introduce any improvements that became desirable.

4334. Did you understand that the effect upon the private gun trade had been satisfactory?—They stated so to me. I had no opportunity of personally ascertaining it. I was given to understand that workmen who had been in the workshop of the Government establishment, soldiers (and they had 150 soldiers), when

when their service expired, fell back into the private gun trade, and it is supposed that that they take with them all the knowledge that they gain in the Government establishment, the results of their experience, and of trials of machinery, whether they have failed or not; and those persons return to their natural position in society.

4335. Are there any artillery officers in this establishment?—Yes, there are several attached to the establishment, and they have the charge of it.

4336. Is it considered by the Belgian Government important that those artillery officers should be there for the purpose of learning the theory and practice of small arms?—Yes, very important; they consider that one great advantage of the establishment.

4337. Can you state whether the whole of the Government arms are made in the manufactory now?—Yes, and all the alterations are made there. When I say that the whole of the arms are made there, there are one or two small parts, such as the nipple, which I think is purchased; it is found more convenient not to make them themselves, they want so small a number, but the whole arm is made there with that exception.

4338. You stated, I think, that you had been informed that the private trade had been employed since this establishment had been formed, has the private trade in small arms in Belgium increased since that time?—I believe there is a very great demand for arms in Belgium now, and I have understood that it had increased; as to the gradual increase that has taken place, I have no means of knowing.

4339. You stated that the Government manufactory was established about 1840?—It was established in the year 1837, not in the same premises as now; it was established in the present premises in the year 1840.

4340. I presume that the arms used by the Belgian soldier at that time were not exactly of the same class as those that are now used?—No.

4341. What did the unimproved arms that were made at that time cost by contract?—In 1836-37 they cost 32 francs; that was the average price of the contract.

4342. During the first three years after the establishment of the Government manufactory, do you know whether that price was reduced?—At the end of the third year on the experimental trial it was reduced to 29 francs 6 centimes.

4343. Does that include any allowance for the plant and superintendence?—Ten per cent. for plant.

4344. I infer from one of your answers that the arms are now considerably improved?—Very much so.

4345. Are those improved arms more costly?—Yes, they are.

4346. Would you just describe the difference between them?—One improvement that they have adopted since 1841 is the swivel lock, which they consider a very great advantage; and another is the break off, which they consider a very great advantage; the alteration to percussion is a matter of course.

4347. What is the difference in the money value of the two arms, the unimproved and the improved arm?—Supposing the work to be the same, the difference in the improved pattern, I should think, would be in our money about 4 *s.*

4348. For how much is the present improved arm made in the Government manufactory in Belgium?—The improved arm is made in the Government manufactory at 42 frances 25 centimes, including 10 per cent. for the establishment.

4349. Is the workmanship in the Government manufactory, of a superior class?—It is of the very first class; at least, so far as military arms are concerned, it is of a superior class.

4350. Their arm is the smooth bore, is it not?—Yes.

4351. Is their smooth bore which they now make for the price you have named, equal in workmanship to the English smooth bore?—I must correct the answer that I gave, the price that I gave the Committee was for the present pattern Minié rifle, the price of the smooth bore was 35 frances 34 centimes, including 10 per cent. for the plant. The price of the Minié rifle is 42 francs 25 centimes.

4352. Do you consider their smooth bore equal to our smooth bore?—Quite equal.

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4353. Are their Minié rifles equal to our Minié rifles?—Quite so as a military arm, in some respects better.

4354. Would you just mention in what respects it is better?—I consider that the principle of the break-off, which they have adopted, makes it very superior as a military arm, and also the swivel lock.

4355. Lord *Seymour.*] What is the break-off?—That is the mode of taking the barrel out of the stock. The pattern that we have in England is a common screw into the breech tang, the breech being screwed into the head of the stock, and you cannot take it off without unscrewing the screw, which eventually gets worn out. But by the Belgiam system, which is the French system, there is no screw at all; the soldier undoes the bands and takes it off, and puts it in again with the greatest ease.

4356. Mr. *Monsell.*] Did you learn whether the Government of Belgium were fully impressed with the wisdom of the course that they have pursued?—Very much so.

4357. Are they extending it?—Yes; they have increased it quite recently; I saw the buildings they had taken in.

4358. How far is machinery introduced into the Government establishment?—It is introduced to a considerable extent; to a greater extent than in our own gun manufacture; and, in some cases, they have machinery for doing what we have none at all for doing.

4359. Still there is a great deal of work done by hand labour?—A great deal, certainly.

4360. Were you able to form any opinion as to whether the gun trade in this country, or the gun trade in Belgium, is in the most advanced state?—I imagine that the gun trade, taking the whole trade in Belgium, is in advance of ours, certainly.

4361. In what particulars?—One is in cheapness. They can make the same kind of gun in Liege much cheaper than we can here, and I know that they have machines to do what we cannot do; for instance, they make at Liege Deane and Adams's and Colt's pistol, precisely similar; in fact they are copied.

4362. Mr. *Dundas.*] Do they make them by machinery?—They use machinery; machinery is certainly used to a great extent in all the gun trades.

4363. Mr. *Monsell.*] Have they the same inducement to use machinery that we have?—No; their wages are much lower than ours.

4364. Did you ever try to get progressive grooves made in this country?—Yes; the committee were very anxious to try the system of progressive grooves, which had been stated abroad to be very advantageous, but we could not get them made in this country at all. In rifling, the progressive groove is deeper at the breech than at the muzzle; but it gradually progresses in depth; at the muzzle there is no groove at all; and as it goes to the breech, it increases in depth gradually; that is what we call progressive grooves.

4365. Do they rifle by machinery?—Yes.

4366. Do you know at what cost?—Yes, at half a franc a barrel.

4367. How much does it cost in this country?—It costs here 2 *s.* a barrel.

4368. Mr. *Newdegate.*] To rifle a barrel?—Yes, speaking of a military barrel entirely.

4369. Mr. *Monsell.*] You spoke of Colonel Colt's pistols; have you had any experience of that arm?—I have known it for 14 years; I have had one for 14 years, and I have bought another; I am going to the East, and I have bought a larger one than I had before.

4370. What is your opinion of the lock; is it a serviceable one?—The lock answers its purpose perfectly well, which is the only thing it is required to do; it has never gone wrong with me, and I have used it a great deal; I have just got another, and it answers its purpose perfectly well; but it is such a different lock to our common gun locks, that it is difficult to make an actual comparison with it.

4371. Lord *Seymour.*] When did you go over to Belgium?—Last week.

4372. And you saw the Government establishment at Liege?—Yes.

4373. And some private establishments?—Yes.

4374. Did you take with you any practical man who could speak to the quality of the work?—Yes, I took Mr. James Gunner, junior.

4375. Could you state what number of muskets the Belgian Government have made

made in different years in their manufactory?—They make about 10,000 a year; it is calculated for that number.

4376. Is 10,000 a year supposed to be sufficient to supply their army?—Yes, it is; they have a very small army.

4377. Have they not introduced lately a new weapon?—No, they have not.

4378. Did you not state that their smooth bore, for 35 francs, that had been introduced was an improved weapon, as compared with the contract arm which cost 32 francs?—The pattern of 1841, which is that smooth bore, is an improvement upon what they had before, which was probably a flint-lock, and it costs 35 francs. The other gun, which I stated cost 42 francs, and which is the Minié, is what they are now trying; they have given it to two regiments; but the arm of the Belgian army is the smooth bore of 1841.

4379. Have they not had occasion to change their arm since 1841?—They have now 30,000 Minié rifles in store, because they are determined to be ready, whatever happens, if they find it succeed, and to be able to deliver out to the whole of the army 30,000; and they are making more now

4380. You stated, with regard to the different parts of the gun, that they forge the barrel much in the same way that we do?—No; they do it by hand, they forge it; they do not roll it in the Government establishment.

4381. Then they do not use so much machinery in making the barrel as is used here?—Our barrels are all rolled, and the others are forged; because the Belgian iron is not so well suited for rolling as the English iron.

4382. Mr. *Muntz.*] What is the reason of that?—I presume the quality is not so good; when they want very good barrels in Belgium they get the iron from Mr. Marshall, of Birmingham; and, I presume, if they could get as good iron in Belgium they would not go to Mr. Marshall.

4383. Why is it not so well adapted for rolling as for working by hand?—The process of rolling subjects the iron to much more violent labour than is the case in forging.

4384. Do you know that fact practically?—It is my opinion that it does.

4385. Have you ever worked at it?—I have never rolled a barrel.

4386. What is the reason that the Belgian iron is not so good?—My information is derived from the Government officers of Belgium. I have no knowledge that a Belgian musket costs 42 francs, except from what I have ascertained to be the fact. I was assured that by the Government officers.

4387. Did they tell you that it required greater strength in the iron to roll it instead of forging it?—Yes; they consider that a rolled barrel does not stand the proof so well as a forged barrel.

4388. Did they explain to you the nature of their iron particularly?—No.

4389. Did you ask the reason for what they stated to you?—I did not; it seemed very natural. As I find that they get their best iron from England, the natural inference is that they have not got such good iron themselves.

4390. If they get the best iron from England, why should they not work it in the same way?—Because it is a greater expense.

4391. To roll it?—The military guns of Belgium are made of Belgian iron.

4392. Then they do not make those guns of English iron?—No, that is in private gun manufactories; the Belgian Government use all Belgian iron, no English iron; they consider that it stands proof better; the average is one barrel and one-sixth in 1,000 that does not stand proof.

4393. Do you know what proof they put in them?—Less than ours; the weights are different, but it is less than ours. I know many other people consider that our proof is unnecessarily high, but that is a different question; they consider that we spoil the barrels in the proof very often.

4394. Lord *Seymour.*] You saw the rifling of the barrels, did you not?—Yes.

4395. In that operation they employed machinery?—Yes.

4396. Have you seen the rifling of barrels in this country?—Yes.

4397. Is the Belgian a superior mode of rifling, as compared with the English?—Yes; both in the mode of doing it and the result there is no comparison; the mode here is very laborious and very injurious to the health of the men employed in it; it is the greatest labour, perhaps, of any to which men can be put; it takes much longer, and it costs four times as much, and when done, it is not so good as what is done by this machinery.

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4398. Have you never seen machinery used in this country for rifling barrels?—It does not exist, I believe, except what is brought from France or Belgium.

4399. You believe that no machinery exists in this country for rifling?—No, not to any extent; it may have been tried, but as a fact in practice, no barrels are rifled by machinery in England.

4400. What portion of the lock was made by machinery in Belgium?—Machinery is used in making every part of it, more or less.

4401. What parts are cast?—No part is cast, it is forged; the parts are all forged; I do not think that any part is cast, it is forged in dies.

4402. Forged in dies?—They usually forge; the cock is stamped.

4403. What part is made in a way different from what it is made here?—The pattern of the lock is different, therefore the tools, the wheels, and the lathe used are different in form; and as there are different curves, it is given a different shape; it is the same principle; there are lathes principally.

4404. What parts of the lock are there made by machinery which here are not made by machinery?—Perhaps those questions had better be asked of Mr. Gunner. There are some things that I saw which are not made with us by machinery, the modes of cutting things, but all the locks are principally made by lathes; different shaped tools are put into the lathe, and the parts are held to them, and the operation is performed.

4405. Perhaps you can speak with regard to the bayonet; is that made by machinery?—No, they are almost all made by hand; they are ground by machinery.

4406. As regards the bayonet, is it as good a bayonet as the new one that has been adopted in this country?—It is not so expensive a bayonet, but, with one exception, I think it is quite as good; in fact, ours is a copy of it.

4407. Is it grooved in the same manner?—Yes; but it is grooved there throughout its length, whereas ours has got a little stop in it; and that is an objection, we consider, because it lets the wet down; they groove it right out the whole length, and that makes it cheaper to do; it is put on a stone, and the stone runs the whole length of it; with us it is a different process.

4408. We have a bayonet less perfect than theirs, and which costs more?—No, our bayonet is more perfect than theirs.

4409. Mr. *Dundas.*] You mean when it is in the scabbard?—Ours does not allow the wet to get into the scabbard, theirs does; it was considered that it was a great advantage to keep the bayonet from rusting, and therefore we adhered to that pattern; the Belgians do not, and they make it cheaper.

4410. Lord *Seymour.*] With regard to the bayonet, they do not use more machinery than is used in this country?—No.

4411. With regard to the stock, how was that made in Belgium?—In very much the same manner as here; they have had machinery for making the stock, but it is not in use now.

4412. They have used machinery for stocking, and they afterwards abandoned it?—It is not abandoned, but it is not in use; there were two reasons why; I could not quite make out whether it was that they did not like it, or that they could make it cheaper by hand labour; labour is about half the price that it is here; I cannot speak positively about that.

4413. You are not aware of the reason why they have disused machinery in making the stock?—No; they would not admit that it had failed at all.

4414. You have named 35 francs as the price of the smooth bore; can you spread that sum over the different parts of the musket, giving the price first for the barrel?—No, I cannot, for the musket that costs 35 francs; for the other, I can; for the 42 franc Minié rifle.

4415. That is the superior arm?—Yes, it is a superior arm, but only superior so far as the barrel is concerned; the barrel before it is rifled, and up to a certain point before rifling, costs 14 francs and 81 centimes, nearly 15 francs; and when it is finished entirely, it costs 18 francs 61 centimes.

4416. Mr. *Monsell.*] That is when it is rifled, is it not?—When it is finished and polished.

4417. Colonel *Boldero.*] Have you brought one over?—There is one at the Ordnance Office.

4418. Lord *Seymour.*] Will you state how much the lock costs?—When finished, it costs 4 francs and 80 centimes.

4419. Could

4419. Could you compare that lock with our lock; for instance, is it as good?—I think it very superior in pattern and in principle.

4420. The pattern for the Ordnance lock is settled by the committee of which you are a member, is it not?—It is.

4421. Then before you settled the pattern, had you not seen the foreign lock?—Yes.

4422. Then why did you adopt a pattern which you now consider inferior?—When I state that it is superior to the lock of 1851, it is because it is a swivel lock, and has the break-off; we have adopted the swivel in the last pattern, therefore it is not superior as regards the swivel, but it is superior as to the break-off. We did not adopt that, because we were told that it had been tried and failed, and it annoyed us very much; but having been tried by the Board of Ordnance some years ago, and having been found to have failed, and they were obliged to change the pattern, we did not wish to introduce a thing that had failed, as it would only be rejected again; we wanted, as far as possible, to carry everybody with us, and to have nothing rejected, therefore we did not adopt it. I have since ascertained, that the reason that it failed before was, because it was made on a faulty construction, and the pattern that is now made in Belgium succeeds perfectly, and I hope it will now be adopted.

4423. You have received a hint respecting the lock which you think might be introduced with great advantage in this country?—With very great advantage; and as I now know the reason why it failed before, I hope it will not fail again.

4424. What is the price of a bayonet in Belgium?—Three francs and thirty centimes.

4425. Do you consider that bayonet equal to the last bayonet introduced for the Ordnance?—Not in one respect. Our bayonet is a copy of that and of the French bayonet; the system of the locking-ring is the only difference; we had before another system of locking; we adopted the system of the locking-ring, which almost all the Continental armies have, and we adhere to our former pattern in other respects; they are the same with a few little additions.

4426. What was the price of the stock in Belgium?—The price of the stock varies, of course; but 2 francs, or 2 ½ francs for the rough wood. I think it was under 3 francs.

4427. How much was paid for completing?—For what they call stocking in this country it is 4 francs and 93 centimes.

4428. What mode have they of uniting the barrel to the stock?—They have the system of bands.

4429. Like our steel bands?—Like our new pattern of 1853, not exactly like, but by bands; ours is different from theirs.

4430. Are their bands made of steel, as ours are?—Yes, I believe they are; I am not very positive about it; I think so.

4431. Mr. *Dundas.*] They are not made of brass, are they?—No; and whether they are steel or iron I will not be certain.

4432. Lord *Seymour.*] What is the whole cost?—There is the sight, at a franc and a half.

4433. Is their sight equal to the new sight that has been adopted here?—I do not think it is; but there, again, that is a matter of opinion; but they have only three notches, three distances, and therefore it is a much simpler affair. No, I will not say that exactly, but it is different altogether. Our sight is calculated for eight different distances, and that is a great difference.

4434. The sight cannot be considered so perfect as ours?—No.

4435. Will their sight strike down each way?—No.

4436. That also is a disadvantage, is it not?—Yes.

4437. That was introduced lately as a considerable improvement, was it not?—Very great indeed.

4438. Their sight is in several respects inferior to ours, is it not?—It is a very good sight for all that; it is much shorter than ours; this is a great advantage, and very strong.

4439. It limits the range of shooting, does it not?—That depends upon the gun that it is intended for; their first sight is at 350 paces; their bed is twice as high as ours; it is solid, brazed on to the barrel, and they start from a different point.

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4440. They have no sight for near distances, have they?—No; the necessity of it is a matter of opinion.

4441. Mt. *Newdegate.*] They have no sight for 100 yards?—No, nor for 200.

4442. Lord *Seymour.*] Will you mention the next item?—There is the break-off, 2 ½ francs; we have none; we have had break-offs in the Brunswick rifles. There is the ramrod, that will cost something; I have not got the whole of the particulars.

4443. Colonel *Dunne.*] What is the price for setting-up?—I have not got that; there is the stocking, that is 4 ½ francs; I have no direct amount of that charge.

4444. Colonel *Lindsay.*] Did your five francs for the stock-finishing include the three francs for the stock in the rough?—No; that is the expense for mounting; that will give 2 ½ francs more for the wood.

4445. Lord *Seymour.*] You stated that one advantage of the Government establishment was that artillery officers might be present, and learn the mode of the manufacture?—That a great many might be present. The Belgians have as many as 10 artillery officers attached to the establishment, and they give them charge of different parts of the establishment, in order that they may thoroughly know the mechanism and manufacture of small arms, and by that means they constantly educate men in their profession, who are able to give an opinion upon the matter when the question of change or improvement comes before them.

4446. Those men are good judges, not only of the arm complete, but of every portion of it?—Yes; and of the manufacture of it, the mode of manufacture, and the metals, and everything according to the length of time they have been in the establishment.

4447. Has any such system ever been introduced at Enfield, of having any artillery officers there?—I believe not.

4448. There was nothing in the constitution of Enfield to prevent it, was there?—The constitution of Enfield is very different.

4449. But the establishment at Enfield being under the Board of Ordnance, and the artillery officers also being under the Master-general, would it not have been easy if it had been considered desirable to have sent some officers to Enfield, so as to have them instructed?—It might have been, certainly, but the establishment at Enfield is hardly of a calibre to have many officers of a superior rank there; there is a general officer at the head of the Belgian establishment; you could not do that here; there is, however, a great deal more done at Enfield now than formerly.

4450. There might be artillery officers of subordinate rank learning the different arts, might there not?—It would hardly have done to have had them under a civilian, who was a clerk.

4451. Was the question ever considered?—I have often heard it discussed by different influential persons, but I do not know to what extent it has been considered officially.

4452. Can you give the Committee a general opinion upon the gun trade of Belgium, compared with that of England; you stated, I think, that the gun trade of Belgium was in a superior state?—I imagine it to be in a superior state; at least, guns can be made much more cheaply there than here; there is more than the difference between the price of the labour.

4453. Do the Belgians, having this great advantage of making them so much cheaper from the lower price of labour, compete with England in any market?—I believe they compete with England very largely, and that they send to other foreign countries a very large number of arms; in fact, I know they do.

4454. They are now carrying on a successful competition with this country?—As to success, I do not know anything about that.

4455. They are carrying on a competing trade with England?—They are supplying arms to other countries.

4456. Are they sending them to America?—I do not know.

4457. Are they sending them out of Europe?—I believe they are sending them to South America.

4458. Are those, do you believe, military arms, or mere fowling-pieces?—Both, I think.

4459. What system of view have they in the Government manufactory in Belgium?—A very severe system of view.

4460. Did you examine it carefully?—Yes; I saw it all done, several times.

4461. Have they the system of gauges?—Yes.

4462. Did it strike you to be very similar to our system?—The system of gauges is something similar to our system; they have a plug as accurate as they can get it, a plug of reception and a plug of rejection; if the barrel takes the plug of rejection then it is rejected; if the plug of reception passes with a proper degree of tightness, it is received; they allow $\frac{3}{10000}$th part of the metre for variation.

4463. The difference between the two plugs allows of that variation?—Yes.

4464. Do we use two plugs that allow of that variation?—Yes.

4465. In the same way?—Yes, in the same sort of way; you cannot work to the $\frac{1}{10000}$th part of an inch.

4466. In gauging the different parts of a lock do they allow a margin?—They have a margin; at least the way is this: there is a slot of so many different dimensions, and it is put to the different parts of the lock, and if the lock goes into this slot accurately, it is received; but if it is too small, or will not go in at all, it is rejected.

4467. Are they satisfied with the test of the gauges, or do they reject on other accounts also?—If there is a crack in the lock they would reject it without gauging it.

4468. Did you look at any of their rejected locks, so as to be able to form an opinion of their system of view?—I did not see any rejected locks; I think I saw some things that had been rejected, but I do not recollect what they were; I think I saw a rejected stock.

4469. You have been a member of the committee who have recommended the pattern for arms for two years?—Yes, since the question was taken up seriously.

4470. Have you considered much the system of view in this country?—I have considered the view in the establishment at Enfield, not the system of receiving the different parts from the contractors. I am aware of the view that is necessary in the Government establishment.

4471. If the system of contract were to be continued in this country, do not you think it might be possible to improve the system of view; as, for instance, if there was a difference between the viewer and manufacturer, there might be first of all an appeal to the inspector?—I should consider that there should be an appeal to some one always where things were to be rejected; the viewers are men of a certain class, and there is an appeal to a higher authority in every service that I know anything of.

4472. Do not you think that it might be an advantage if some committee were appointed to whom, in cases of dispute, an appeal might be made, so that while, on the one hand, the public service was protected, on the other hand, the manufacturer might feel that he had justice done him?—I have doubts about it; it depends so entirely upon the manner in which that committee should be constituted, it is very doubtful.

4473. Would it be impossible to form such a committee?—No, I do not say that, but I think it would require very great care; it would be very likely to be very objectionable. It is difficult to say that it would be impossible, but I think it would not be desirable. The committee would become, say, equally divided; one side for the manufacturers and one side for the Government, and then they would be in the same fix as before.

4474. But if you had a committee of three persons, that difficulty would not arise?—When two were named by the manufacturers, the Government member would say that they were not properly represented; and when two were named by the Government, it would be said that the manufacturers were not properly represented.

4475. Could not the Board of Ordnance appoint a committee in whom the Board would have confidence?—When appointed it might be so; but I have doubts about it.

4476. Do you think that the Ordnance could not find men possessing sufficient mechanical knowledge, and who, without being immediately connected with the trade, would be entitled to confidence?—I think as it is at present, not having a Government establishment, you would be very likely to fall entirely into the hands of the manufacturers.

4477. If there were officers who had studied the thing practically, they would form,

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form, would they not, a Board to whom such matters might be submitted?—Yes, and with very great benefit.

4478. You think, do you not, that the Belgian break-off is better than that used in our service?—Yes, I think the system very much better than our system.

4479. When the new rifle was ordered in this country, had not the authorities the Belgian arm before them?—Yes, and the French arm.

4480. Then the question of the break-off was considered at that time, was it not?—Yes, I stated that it was considered, and we were very anxious to introduce it, but we were informed by an official person, whose duty it was, that it had been tried before and rejected, and therefore we did not want to have the gun thrown back on our hands, and therefore we did not adopt it. I believe myself that it would be a very great improvement, and we know now why it did not succeed before.

4481. Mr. *Dundas.*] Is that break-off something similar to that which is used in our best fowling-pieces?—Yes, precisely so.

4482. An Enfield musket was exhibited to the Committee some time ago, and the barrel of it was separated from the stock in much the same way?—Then it was not the pattern of the army; it might have been the gun that was made for General Brown, which had the break-off, and a short barrel; perhaps the Committee saw that; or it might have been the old gun of 1841; 800 were made then, with the break-off; but the system was rejected.

4483. What was the number of men employed in the manufactory in Belgium?—The number of civilian workmen is 600 at the present time, and the number of military workmen, 150.

4484. Did you hear what their wages ranged from?—I did; it is all piece work there, but the best men can gain about three francs a day; suppose them divided into two classes, the one class receives three francs and the other two francs a day.

4485. They are paid according to what they turn out?—What they can gain by piece-work.

4486. A stated price being attached to the work that is given into their hands to finish?—Yes, it is settled beforehand.

4487. Did you observe whether many of the tools that were used in the manufactory had been made in this country?—I did not notice that.

4488. You stated that there was no self-acting machinery for rifling in this country; have you seen Colonel Colt's manufactory?—Yes, I have.

4489. There is machinery there, is there not, for rifling barrels?—Yes. I should state that I was speaking entirely of military barrels. Colonel Colt has a machine for rifling pistols.

4490. Mr. *Monsell.*] Which view is the most severe, the view at Enfield or that at Liege?—The view at Liege; there were more tests at Liege than in ours, but I do not think the work was more accurate than ours.

4491. Do you think that it was as accurate?—I should say it was, but then I am not a viewer; I have seen it done; I should say that it was very much the same thing; quite as severe in some respects; the only difference is that they use more tests; but I am not sure that our tests are not more strict.

4492. Are you aware whether there is an appeal from our viewer to the inspector?—Yes.

4493. If his decision is not satisfactory, there is an appeal to the Board of Ordnance, is there not?—I take it as a matter of course there is.

4494. Mr. *Newdegate.*] You stated, did you not, that it would be a great advantage if a Government manufactory were established in which artillery officers would be able to study, so as to gain a practical knowledge of the details?—Yes, very great.

4495. As no such Government manufactory at present exists, I conclude that that is an advantage which the small arms committee have not yet enjoyed?—The small arms committee have had to do the best they could.

4496. It would have been better if they had had a Government manufactory to study in, would it not?—Yes, certainly.

4497. That is one of the principal reasons, is it not, why you recommend the establishment?—No, that is one of the reasons, the advantage would be gained by the country.

4498. Do not you conceive it possible that the small arms committee have not been

been able to obviate some of the difficulties which have arisen in contracts, owing to the want of a practical knowledge of the actual details of the manufacture?—The committee have had nothing to do with the contracts.

4499. But the small arms committee give the orders for the arms to be contracted for; do they not?—They merely settle the pattern.

4500. In doing that they are not competent, are they, to decide upon the probable cost of the manufacture, if they are not qualified to deal with the details of the manufacture?—They are competent to find out what a gun will cost; the information within their reach enables them to ascertain that.

4501. That must be obtained from other parties, if they have not a practical knowledge of the manufacture themselves?—The information as to the price of different articles is obtained, and upon that information they decide upon the pattern of the gun that they recommend.

4502. The body has not within itself the knowledge that would render it independent of extraneous information on that subject, has it?—Certainly not, as to the cost. And yet I should say the committee has that knowledge within itself; one of the members is a man who ought to know. But the Board of Ordnance settle all that themselves; they make the contracts, and not the committee; we cannot tell what contracts the Board of Ordnance may make, nor can the Board itself till the tenders come in; that depends upon a matter of money, and that sort of thing.

4503. Generally, some knowledge of the process of the manufacture would be a great assistance in judging both of the practical bearings of the question and the cost, would it not?—Yes; but there is a person on the sub-committee, Mr. James Gunner, who is practically acquainted with the subject.

4504. How long has he been there?—Ever since the committee was appointed, I believe.

4505. Has he been acting with you during that length of time?—Ever since we have been appointed.

4506. Is that Mr. Gunner, junior?—Yes.

4507. You stated that you were not exactly competent to give an opinion as to whether the severity of the view in Belgium was equal to that at Enfield?—A viewer would give a better opinion. I think it is very similar; but as to whether it is a little more or a little less severe, I am not competent to say.

4508. You stated that there were many respects in which the Belgian musket has the advantage over the English musket?—Yes.

4509. Do you consider that the shape of the stock of the Belgian arm is as good as that adopted in 1853 for the new Minié musket?—The shape of the stock is very similar; it is a little stronger in the small of the butt, and the heel-plate is not quite the same, but it is very similar.

4510. Is it as good as the English musket?—I consider it quite as good; but not having the pattern with me then, I could not be quite certain as to any little difference.

4511. You stated, did you not, that one of the Belgian muskets was in the possession of the Board of Ordnance two years ago?—No, one year ago; the last pattern came over last summer.

4512. Are the Committee to understand that that pattern was in a great measure adopted by the small arms committee?—Not at all.

4513. Do you think that the pattern at present adopted is superior or inferior to the Belgian pattern?—In one respect it is superior, and in others it is inferior; for instance, the 1853 pattern is much lighter, and that is an advantage in our favour; the Belgian gun has got the break-off, and that is an advantage in favour of the Belgian.

4514. But the weight is in favour of the English pattern?—Yes, but then it is a smaller bore; the Belgian gun has a much larger bore, which is in favour of the Belgians; I saw the Belgian shooting, and the comparison is in favour of ours.

4515. What was the reason why the small arms committee did not adopt the Belgian bore?—Because they considered the other better.

4516. Do you consider that the English musket is inferior because the bore is smaller?—No, that remains to be seen; our gun is merely on trial; so is the Belgian. In some respects it is an advantage if you can have a small bore, but in other respects the larger the bore the better, if you do not want much shooting; but you cannot carry much ammunition, and so it is a disadvantage, and there are many other considerations.

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4517. Have you seen the Belgian rifles tried?—Yes, in this country.

4518. Is the shooting of them equal to that of the new pattern rifle?—I do not think it is.

4519. In that respect they are inferior?—No; that again gives the Committee no idea of the Belgian ammunition; the ball is twice as heavy as the English; all those things must be taken into consideration, and they are most important.

4520. With respect to the weight of the ball, the Belgian arm is inferior to the English, is it not?—Very inferior, and also in the shape of the ball.

4521. In shooting it is also inferior, is it not?—I said that it has been tried in this country, and perhaps it is hardly fair to say so; I have no doubt that the Belgians would shoot their guns better than we can; I have seen the shooting, but I could not make a fair comparison.

4522. So far as you have seen, you have no reason to think that the Belgian gun is equal to the English gun in shooting?—No; I think not. I should be sorry to give an opinion. In this country you cannot get the ammunition for which it is calculated, viz. the Belgian powder; we used English powder, and that again makes a difference.

4523. So far as you could test it, the shooting of the new pattern gun is superior to that of the Belgian rifle?—Yes, unquestionably, so far as we have been able to ascertain the difference.

4524. You have stated that the Belgians have 30,000 arms ready made?—Yes.

4525. How long have they been made?—They have been gradually making them in the last three or four years; they began making them before they had their present ball; the ball that they now are trying they have only had twelve months.

4526. They had been three years making 30,000, had they?—I imagine that the system has been gradually growing up in the last three or four years.

4527. You stated that the whole produce of the Belgian manufactory has been about 10,000 muskets a year, and that it has taken about three years to produce those 30,000?—At 10,000 a year it would of course take that time; I suspect that they have been four years doing it; they have had alterations to make, and swords to make, and to repair the other arms, and all the other things to do. I dare say they have not worked the establishment up to its full strength in making new arms only.

4528. You have stated that the general trade of Belgium competes with the general trade of England abroad?—No; I said that they made very largely for other countries.

4529. So do the English trade, do they not?—Very probably.

4530. Probably there is competition between the two?—If the two countries make the same things, there is a competition. I can make no comparison.

4531. Mr. *Muntz.*] Can you state to the Committee the amount which the Government of Belgium have expended in the establishment of this manufactory?—Not the actual amount, but they calculate 10 per cent. upon the price.

4532. You stated, did you not, that the number of guns manufactured was about 10,000 a year?—Yes, working merely by day.

4533. What kind of gun do you refer to?—To the present rifle pattern.

4534. How long have they been in the habit of making that?—About three or four years, so far as I know; I do not know when they began.

4535. They have ascertained that they can make 10,000 a year by their present outlay?—Yes, with the present establishment.

4536. You stated just now that the trade in Belgium had not improved till the Government established their manufactory?—That the trade of Belgium had been at a stand still for about 30 years, the manufacturers kept making the same things on the same patterns, and it was considered to be standing still.

4537. Do you know that from your own observation and knowledge, or from information derived from others?—From information which I gathered in Belgium.

4538. You do not know that they improved so much between the years 1814 and 1830, as to supersede a great part of the trade of this country?—I have stated just the reverse, that for 30 years there was no great improvement in the Belgium gun trade, everything went on on exactly the same system, and the same pattern as before.

4539. Are you speaking of muskets only?—Yes, the military gun trade.

4540. That is to say, the Belgian Government made their own muskets the same for 30 years?—The Government bought them by contract for that time.

4541. Did you hear whether during the time that Belgium formed a part of the empire of France, they then manufactured their arms?—I did not hear that.

4542. You stated, did you not, that they used some machinery?—Yes.

4543. Are you aware to what extent they use machinery?—I could not state that.

4544. Can you state what parts of the gun are made by machinery?—In almost every part of the metal part of it, the lock and all that, the lathes are used.

4545. Did you see the locks made?—Yes.

4546. Do the Belgians make the lock entirely by machinery?—They do not put a bit of iron into the machine, and it does not come out a lock, certainly; machinery is nearly all mixed up with hand labour.

4547. I suppose they use machinery as it is used here?—Yes; but in this establishment of the Government there are many more machines for doing different little things than are used here.

4548. When you speak of more machinery being used there than here, do you mean as comparing it with the Enfield establishment?— Yes.

4549. Have you visited other manufactories in this country either in Birmingham, or the neighbourhood of Birmingham?—No.

4550. You do not know the extent to which machinery is used there?—No.

4551. You stated, did you not, that stocks are not now made by machinery in Belgium?—Yes.

4552. Did you hear any remarks made as to the extent to which they carried machinery in making stocks, when they did so make them?—I think they were not entirely finished by it, but very nearly.

4553. Did you hear from them whether, when they made use of machinery for making stocks, they effected any saving, or the contrary?—I imagine that they did not find much saving; it was not at work, and I could not ascertain.

4554. How long had they left off using it?—About 18 months or two years.

4555. Did you hear how long they did use the machinery?—I think for about two years.

4556. After that they put it aside because they did not find it effected a saving?—I cannot say.

4557. Did you hear any other reason assigned?—No, it was not a thing that they liked to speak much about.

4558. You stated, did you not, that a great improvement was made in the lock on account of the swivel?—Yes.

4559. But it is used here the same as it is in Belgium, is it not?—Not till last year.

4560. You think that the swivel is a good thing?—A very great improvement.

4561. Yo do not think that a roller lock is equally good?—Decidedly not.

4562. Do you think that the gun made in Belgium, as compared with our Minié rifle, is as perfectly made, and as well finished?—It is finished much in the same way; but there is a great deal of work in our gun which is, I think, unnecessary.

4563. With respect to the price of labour in Belgium, you stated, did you not, that some men earned two francs and others three francs?—Some men make more than that; but by dividing the establishment of 750 men into two classes, you find that the best men, filers and others, get three francs, and the others two.

4564. Did you ascertain what they earn in forging barrels?—Yes; they get three francs.

4565. Is it all piece-work?—Yes.

4566. You have given merely the average price of the piece-work?—Yes.

4567. You were speaking of the Belgian plan of making progressive grooves, and you stated that you did not think that they were made in this country; have you never seen any rifles made in this country with progressive grooves?—Yes, but not made by machinery; they are made in the most bungling way. There

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is now a machine for making them with what are called progressive grooves; it is a French invention.

4568. Have you seen that at Deane & Adams's?—I have seen it.

4569. Have you ever seen any machines for rifling at Birmingham?—No; I do not believe that they exist; we could not get our barrels rifled with progressive grooves except by the very clumsy process of cutting the barrel in steps, and then knocking off the edges.

4570. Were similar articles manufactured with common grooves as well as with progressive grooves, and at the same cost?—I think that by the Belgian machines there is no more expense in making the progressive grooves. The French make all progressive grooves; they do not use an equal depth of grooves.

4571. You stated, did you not, that you were at ———— manufactory, at Liege?—Yes.

4572. Is not the son of the former inspector, Mr. Lovell, connected with that manufactory?—No, he is not; he was, but he is not engaged there now.

4573. You did not see him there?—No; I believe he is not connected with the establishment. I have reason to know that he is not.

4574. Were there any reasons assigned for the remarks which you have made, that there had been no improvements in the gun trade in Belgium for 30 years?—Yes; the reason assigned was, that the work was all done by the workmen in Belgium in their own houses; there was no such thing as a private manufactory; the workmen all had the same tools, and there was no improvement.

4575. You do not speak from any observation of your own, when you say that the trade has increased very much since the establishment of the Government manufactory?—It is from inquiries which I made at Liege.

4576. Was it reported to you that the arms had improved in quality or increased in quantity, or in both?—In both, as I understood.

4577. You stated that their break-off was an improvement upon our gun; did I not understand you also to say that it had been tried in this country, and had been rejected?—Yes.

4578. Do you know the reason of that?—It was stated, and in fact I believe it was found, that the ears of the hutt broke off occasionally; that was a defect; and also it injured the wood of the head of the stock where the break-off went in.

4579. Was it tried to any extent?—It was tried with the Brunswick rifles.

4580. Was it tried with the Brunswick rifles only?—No; also with some of the line muskets made in London.

4581. You stated, did you not, that the reason why it failed was now known; will you state what that reason was?—Yes; the reason was, that the two curves of the hutt were not the same; the inside curve was one curve, and the outside, instead of being a corresponding one, was different; and the consequence was, that when it was driven into the place to receive it, the motion that took in one curve would not properly take in the other.

4582. They did not fit well, I suppose?—Not only that, but there was another reason; they were not made of steel, they were made of iron; the Belgians make theirs of steel.

4583. For the whole of the break-off?—No, only the hutt; the break-off is partly of steel; the hutt is fastened to the screw.

4584. Did you find that the break-off in the Belgium musket was perfectly well fitted?—I think very well fitted indeed; I thought it one of the best parts of the fitting.

4585. Did you inquire whether, when it came to be used, the parts did not loosen?—Not the least; they have taken off all the bands of the gun and fired it, and the barrel never moved out of the stock; it was entirely kept in its place by the hutt of the break-off, so well fitted is it.

4586. Do you know why they fitted them so badly in this country?—I do not know.

4587. Were they made at Enfield, or at Birmingham?—I do not know, but the pattern was settled by authority.

4588. But the pattern might have been a break-off, and was probably not a good one; it seems that somebody made a bad break-off, and you cannot tell who made it?—It was before my time.

4589. You

4589. You think that they can make guns more cheaply in Liege than in England?—Yes.

4590. Does not that arise entirely from the cheapness of labour?—I think that the difference is more. I am not a gun-maker, and I may be wrong, but my impression is that the difference of price is more than the difference in wages.

4591. What number of francs did you say the Minié rifle cost?—Forty-two-and-a-quarter francs.

4592. That would be about a guinea-and-a-half, would it not?—Yes.

4593. Then suppose ours costing three guineas, you double the quantity of labour, you would find it pretty nearly come to the same; and they have not the same expensive sight?—No.

4594. From your own knowledge, can you speak of the comparative quality of the work in the Minié rifle in Belgium and that in this country now; is the finish of the work as correct, as perfect, and as likely to be durable in the Belgian as in the English rifle?—I have stated that the work is not so highly finished; but, so far as durability goes, it is quite as good as the present English Minié rifle.

4595. You have stated, have you not, that a good many parts of the work that are highly finished are not necessary for working, or for use?—Yes.

4596. Do you think that the fitting of the lock and the barrel, or the fitting of the lock itself, or the fitting of the whole gun, where the parts are required to be well fitted, is as correctly and perfectly done in the Belgian gun as in our Minié rifle?—I think not; there is more pains taken in the Minié rifle of 1853 than in the other.

4597. I presume you would agree with me, that if one gun is more perfectly fitted than another it will stand more wear and tear without being injured?—If it is more perfectly fitted, certainly; but not as to the finish; there are many parts of the finish that do not affect the durability of the gun.

4598. Mr. *Monsell.*] Is the Belgian gun less perfectly fitted?—I should say that the two are very good, but I should think there is a little more pains taken in the fitting of ours.

4599. Mr. *Newdegate.*] You stated, in answer to a question of Lord Seymour, that there was an objection to a mixed committee of reference with regard to small arms?—I stated that I imagined it would be found a very difficult system to work, a mixed committee composed partly say of officers of the Ordnance and partly of persons appointed by manufacturers; it is a question that I have considered, but not maturely.

4600. Suppose that there were some persons who had been brought up to the trade of gun-making appointed, not by the manufacturers, but by the Board of Ordnance, would not the knowledge possessed by such civilians be of use to you?—Yes, it would be of very great use.

4601. In matters of reference with respect to contracts and work?—Yes, certainly.

4602. Mr. *Monsell.*] Is the inspector of small arms generally a civilian?—He has for many years been so; during the war he was not.

4603. Mr. *Newdegate.*] That is supposed to be an effectual manner of removing the difficulty under which military men labour, from the want of an accurate knowledge of the details of the manufacture?—That does not follow at all.

4604. Are the Committee to understand that you do not think the system satisfactory under which a civilian has been appointed as inspector of small arms, acting with the small arms committee?—The inspector of small arms does not act with the small arms committee, as to his duties. The small arms committee have nothing to do with the manufacture of arms; all the improvements and inventions are submitted to them, but they have nothing to do with the manufacture after that.

4605. You stated, did you not, that if some had been trained in the Government manufactory, where they could have observed the process of the manufacture, they would be better competent to decide practically upon the orders to be given?—It would be a very great advantage.

4606. Hitherto no civilian has been associated with that Board who has had a practical knowledge of the details of the manufacture?—Yes, I stated before that Mr. James Gunner had been with the sub-committee throughout the whole time; I believe during the whole of the examinations in regard to the alteration of the arm.

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4607. For about what period?—During the last two years; since the Minié question has been discussed.

4608. Mr. *Muntz.*] Was he one of the committee?—He was one of the sub-committee; there is a general committee composed of general officers and admirals and others, so as to represent each branch of the service; and a sub-committee who report to this committee.

4609. I presume the opinion of Mr. James Gunner was given for the other members to act upon; he had no vote in the committee, had he?—I think not.

4610. Colonel *Dunne.*] Was not this the intention, that Mr. Gunner should supply the practical information to the officers composing the committee which they required?—Yes, he was appointed for that purpose.

4611. He was always called on by the committee when they wished for information?—Yes.

4612. Mr. *Newdegate.*] He is not now the inspector of small arms, is he?—Mr. James Gunner is not; Mr. Gunner, senior, is.

4613. Therefore the senior officer of the civilians employed for the manufacture of arms, was not associated with your committee?—Mr. Gunner has been, I believe, only inspector for a month; this pattern has been settled for 18 months.

4614. The inspector of small arms, the head civilian, was not associated with your committee?—Yes; the then inspector of small arms, Mr. Lovell, attended the meetings of the committee; it was his duty to do so.

4615. Mr. *Muntz.*] He did not vote?—No.

4616. Colonel *Dunne.*] Is it usual for any but military men to decide upon what is to be done?—No.

4617. Those practical men are called upon to give the results of their practical knowledge upon which the military officers decide?—Yes.

4618. Colonel *Lindsay.*] In fact, your committee was one of experiment, not of supply?—Yes; of course the question of price to a great extent came under review, and the question of manufacture, the facility of manufacture, which is a very important thing; but it rested with the Board and the Master-General afterwards to refuse the arm recommended, if too expensive; we merely gave our opinion.

4619. Colonel *Dunne.*] Was it not quite competent for the committee, or any member of it, to call upon any civilian if he wanted information as to price and form?—Yes, we did so very largely, and received very great assistance from many of the principal gun-makers in England.

4620. Were not patterns furnished and advice given by Mr. Wesley Richards, of Birmingham?—Very largely, and many others; Mr. Wilkinson, Mr. Lancaster, Mr. Purday, Mr. Greener, and all the principal gun-makers were invited to send patterns, and Mr. Pritchett, whose ball has been found to be far superior to any other.

4621. Were not several of the suggestions of Mr. Wesley Richards actually adopted by the Ordnance?—Some were actually adopted, and some were rejected; I do not think more of his than of any of the others; the result of all the information we obtained was embodied into the one arm, which is the arm of 1853.

4622. When you call it the Minié rifle, is that correct; was not the discovery of Captain Minié made with respect to the ammunition?—The whole discovery is in the ammunition; the barrel is the same; the barrels made 100 years ago will shoot as well as this.

4623. Was not the other discovery called the *carabine à tige*?—I think that the first discovery, the principle of expanding the ball in the barrel, was before that.

4624. Is not that the only discovery as to the arm that has been used in France or in this country?—Yes, the *carabine à tige* has been used in France.

4625. Are any of the Belgium muskets *à tige*?—Yes, two regiments of chasseurs are armed with them.

4626. Have we adopted any of them?—No. The French do not like the Minié muskets, nor do the Belgians.

4627. Do not the Chasseurs d'Afrique use the *carabine à tige*?—Yes, all the Chasseurs de Vincennes use it.

4628. Mr. *Muntz.*] You stated, did you not, that the bayonet was not altogether made by machinery?—Yes.

4629. Did you see any of them made, or were they forged in the same manner as they are here?—Yes.

4630. You stated, did you not, that the cost was about 2 *s.* 6 *d.*?—About 3 ½ francs finished; they use machinery in cutting out the slots to fit it on to the musket. They do not stamp it out; they grind the grooves out, they forge them.

4631. Is their bayonet fluted on three sides?—Yes.

4632. And brought out to nothing at the bow?—Yes.

4633. You did not see any machinery except that which cuts out the grooves?—There was machinery for boring the sockets, and for cutting out; no wonderful machinery.

4634. Did you ascertain whether they were made of steel or not?—The blades are, and the sockets are of iron.

4635. You do not know to what extent steel is carried down the blade?—It is close to the bend.

4636. Do you know what such a bayonet as that would cost in England?—I know that we pay 7 *s.* 6 *d.* for our bayonet for the new arm, but I do not know whether it could be made for less.

4637. Do you think that there is much difference between the Belgian bayonet, and the bayonet that was used for the percussion gun, before the invention of the Minié rifle?—The percussion bayonet in England was very different from that in Belgium; it was only fluted on two sides, and we had not then the locking rings.

4638. Did not a committee from the Board of Ordnance go down to Deane & Adams's to examine their rifles?—I do not know anything of that.

4639. You spoke of the advantage of having artillery officers to preside over the small arms manufactory of the country; do you think, from your experience, that an artillery officer knows much about small arms?—No; and it is for that very reason that they ought to learn something about it, so that the Ordnance, who make their own arms, should have their own people who know something about them. That has been found to be a great benefit in other countries.

4640. Colonel *Dunne.*] Do not you think that although artillery officers have their attention more particularly directed to cannon, and to the construction of heavy ordnance, still that that study leads to the consideration of the effect of small firearms?—Yes; but I do not think it follows that they know much about the matter.

4641. Are not all the artillery armed with firearms?—Yes, but not with muskets. An artillery officer never sees a musket; they use carbines.

4642. Would he not be able from his knowledge of the mechanism of it to be perhaps a better judge of small arms than an ordinary officer of the line?—Certainly; the artillery officer from his natural study is more likely to be so; but I never made any comparison.

4643. But officers of the line are more acquainted with the effects of the arm they use than with the manufacture of it?—Yes, they are much more acquainted with the use of the musket and the properties of it than the artillery officers; but the artillery officer is more likely to be a better manufacturer of it; but at present, as he has no knowledge, it is desirable to have an establishment where he could become acquainted with it.

4644. Mr. *Muntz.*] You spoke as to the propriety of having an appeal in case of disputes about the viewing of firearms, and you said that there was now an appeal to the inspector?—Yes.

4645. Do you consider that the inspectors are generally so well aware of the nature of the trade and the circumstances connected with it that they are the proper persons to appeal to?—They ought to be.

4646. Do you think that they are?—They are appointed for that purpose, and I suppose they are.

4647. Have you come in contact with any of the inspectors so as to be able to judge of that?—Yes, I have.

4648. What do you think of them?—I do not think that that is a question that I can answer; I should not like to give an opinion upon the capability of a person appointed by the Board of Ordnance.

4649. Your experience on the committee does not enable you to say whether the inspectors with whom you have come in contact are sufficiently intelligent to be able to decide the disputes I have referred to?—Yes; the experience that we have had of a such a person is, that he is perfectly able to give the opinion that we want. Mr. James Gunner is perfectly able.

4650. Mr. James Gunner was not an inspector, was he?—No, but he was associated with us.

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4651. My question has reference to the inspectors of military arms; have you come in contact with any of them, so as to enable you to give an opinion about them?—I have come in contact with them, but I cannot give an opinion of public officers who have been appointed by a public department.

4652. You have just returned from Liege; did you learn whether they had been making any muskets for the Emperor of Russia?—I did.

4653. Have they in Liege?—Yes.

4654. Latterly?—Yes.

4655. What species of arms are they?—Precisely the same as the French smooth-bore musket.

4656. To what extent have they been making them?—They have been making very largely; they have just finished an order for 60,000 smooth-bored percussion muskets.

4657. Similar to ours?—They are the French pattern instead of ours; the French bore; and they have a very large order for more.

4658. Colonel *Dunne.*] How long do you think they took to complete the order for the 60,000?—I do not know.

4659. Colonel *Boldero.*] You have stated that the Belgian Government turn out 10,000 per annum?—Yes.

4660. Have they employed skilled manual labour to the extent of 750 men?—Yes.

4661. It would appear, without a little further explanation, that those 750 men were employed annually to produce 10,000 muskets?—I think I have stated that there were many repairs to be done; they have to change their arms, and make swordblades and pistols. Now I do not believe they are making so many as 10,000 a year; I am confident that they are not; they have many alterations to make.

4662. They are employed in making other firearms and weapons of war?—Yes; now they have 750 workmen in the establishment, besides 10 artillery officers, and the viewers, inspectors, and so on.

4663. Is that in addition to the 750?—Yes; 150 from the army; the others are civilians.

4664. Mr. *Muntz.*] Supposing they do not want guns to the same extent, did you hear what they do with their men, supposing they only want 3,000 a year?—The soldiers go back to their regiments, and the civilians, I presume, would be dismissed. They have calculated their establishment according to their wants; they have calculated that they consume about 10,000 arms a year on the average, with alterations, and so on. It has been in work about 14 years.

4665. Has it been constantly at work?—Yes.

4666. Colonel *Dunne.*] Would not a very large number of those soldiers be absorbed into the regiments as armourers?—Yes; that is one advantage. They bring up all their armourers in this establishment.

4667. Mr. *Newdegate.*] What is the number of the Belgian army?—I believe they have two different divisions. I think they have about 30,000 or 40,000 actually in service; and they double that by a second instalment, which is prepared and ready to come out in a moment.

4668. Colonel *Lindsay.*] They are embodied?—Yes, but they are not called out in active service. That is a year ago; and I have no doubt now that it is increased.

4669. The strength of the army is estimated at about 130,000 men, is it not?—Including all that are remaining in the second and third divisions. It is like the French. I think it is about 130,000.

4670. Have they prepared arms for about 130,000 men?—That I cannot say; I do not know.

4671. You have stated that this manufactory was employed for other military purposes besides muskets; are not some of those purposes such as are effected at Woolwich?—Yes, they make copper caps there.

4672. Do they make any portion of the artillery stock?—No, that is made in the foundry; that is a separate branch of the establishment, under the same officer. They have a foundry for great guns, and they cast all of them themselves.

4673. When you spoke of 750 men, you did not include that department?—No, that is quite a separate establishment, only it is under the same head.

4674. Mr. *Muntz.*] Did you hear whether the Belgian Government manufactured

factured for other countries as well as for themselves?—No, they do not make for others. Lieut.-Colonel *Alexander Gordon.*

4675. Neither small arms nor cannon?—Yes, they make cannon. Their own demand for cannon is very small. There is no private cannon foundry in Liege; the Government make the whole. 27 March 1854.

4676. Colonel *Dunne.*] Do they make iron guns as well as brass?—Principally iron. They make their own brass guns, but I do not think they do for other countries; but iron guns they do. The French make their own brass guns.

Mr. *James Gunner*, called in; and Examined.

4677. Mr. *Monsell.*] DID you accompany Lieutenant-colonel Gordon to Belgium?—Yes. Mr. *J. Gunner.*

4678. I believe you do not speak French?—I do not.

4679. Therefore, all that you know as to the prices and the arrangements of the establishment at Liege you know merely through Colonel Gordon?—Principally from what I have heard him state.

4680. All that you can speak to is the workmanship of the arms that you saw?—Yes, and the construction.

4681. Did you see the Minié rifles which are at present being constructed in the Government manufactory at Liege?—I saw them being manufactured there.

4682. Do you consider that arm to be equal to our Minié rifle?—I consider it to be a good, sound and serviceable arm.

4683. Do you consider it equal to our Minié rifle?—No, not in point of style and finish. I consider the work to be sound and well put together, and capable of being as durable and lasting as ours.

4684. Do you consider it to be as serviceable a weapon as ours?—Yes.

4685. Do you consider the parts to be as well fitted together as the parts of ours?—Most of them are.

4686. Will you mention any parts that are not so well fitted together as ours?—The work is not let in quite with so clean a cut as ours, but the barrel is let in sound and as close to the stock. I found the lock straps were filed square generally and fitted well, but the time was so short that I did not take them to pieces and examine them minutely, though I saw them viewed and inspected. The inspection I considered quite sufficient for what was necessary for any military arm, though a little different to ours in the shape of the jigs and models used. Take the lock. I saw the lock stripped, and the plates offered to a hardened, solid plate; the holes were then placed in correct, the bridles were offered to the pattern, and I found them all correct, and the scears the same. I found they worked pleasantly, and evidently they were fitted square, and it was serviceable sound work.

4687. Do you consider the Belgian barrel to be equal to ours?—It is not so highly finished; it is well bored, straight, and beautifully rifled.

4688. How much do you consider to be the fair difference in cost between our barrel and theirs?—Our barrel is much more difficult, as the bore has a much smaller hole. I would compare it more with the pattern of 1851. The inside of the barrel is not quite so straight, though it is a straight barrel and will shoot well. The outside is not stuck up so true. I do not think that their barrel is ground quite correct to the gauges; there was a fault from the grinding, but none but a practised eye could detect the difference between theirs and ours. With regard to the gauges used in testing it, they have a receiving plug and a rejecting plug, as we have, and they have a method of testing the barrel outside to see that it is turned correct and equal in thickness. It is done by forcing the plug or instrument into the bore, and there is a projecting thing which comes along and turns round the outside, which I consider a very good and severe test. The breach end of the barrel is stuck up very correct to the sight; very square. The nose end of the barrel is all correct in size, and tested, as we do, by gauge. So far as gauges are concerned, the barrel is tested equally the same.

4689. Can you state what would be the fair difference in cost between our barrel of 1851 and the barrel of which you are now speaking?—I should think about 2*s.* or 2*s.* 6*d.*

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4690. Do you consider their lock equal to ours?—So far as durability goes, I do; it is of a different construction.

4691. Can you state what would be the fair difference in price?—They have a pattern similar to our back-action musket; it is different from the side action. The lock of their Minié rifles is a well constructed lock, and easier to manufacture. I should think it worth 6*s.*, to purchase by contract.

4692. What is the price of ours?—Eight shillings and threepence.

4693. Do you consider their stock to be equal to ours?—It is a different form altogether, and made out in a different style. I found that they use the same correct gauges, and test them nearly in the same way. So far as real service goes, I think it equal.

4694. What would you consider to be a fair difference in the price between the two?—I do not know. With the back-action guns there are no shoulders; this part (*pointing to a gun*) is very much heavier, thicker, and stronger, which is necessary for a back-action lock; a plainer style would be equally sound and serviceable.

4695. Can you state what you consider to be the fair difference in price between the two arms?—I should think a third at least; there is a third less work in the construction.

4696. How much does our arm cost?—The work is done differently; theirs is a bright barrel; ours is an engraved lock. I believe the price of our stocking is regulated; we pay about 4*s.* 9*d.* a-piece.

4697. Lord *Seymour.*] Can you state the price of our rifle as compared with the Belgian, taking the Belgian at 42 francs?—That includes the stocking and screwing together; ours would be about 13*s.*

4698. What is the whole cost of our gun in a complete state as compared with the Belgian?—The same work would cost here about 13*s.*

4699. But taking the whole cost of our gun; I understand the whole cost of the Belgian rifle is 42 francs; what is the whole cost of ours?—The whole cost of ours, including the plant and the superintendence, is about 3*l.* 4*s.* at Enfield.

4700. Mr. *Monsell.*] Do you consider our bayonet to be better than the Belgian?—I do.

4701. What do you consider to be the fair difference in price between the two bayonets?—I should think at least 3*s.*

4702. Mr. *Muntz.*] What is the great difference between the two?—The workmanship is one great difference, and the construction is another; this (*pointing to a bayonet*) is equitriangular; the Belgian is not, it is flat one way and of another form; it is hollowed, but of a different form.

4703. Mr. *Monsell.*] Which is the more strict, the view at our manufactory at Enfield, or the view at the Belgian manufactory at Liege?—I should say that the view at Enfield is the stricter view.

4704. Will you explain in what particulars?—Every part having to fit into jigs or models, the margin between receiving and rejecting is more strict; I am not quite acquainted with it in Belgium; I understood from Colonel Gordon that it was considerably more than with our own; we allowed with the Minié rifle in 1851 only $\frac{1}{2000}$th of an inch; with the present we allow $\frac{1}{3000}$th; I believe their margin is more.

4705. Did you visit any of the private manufactories at Liege?—Yes, to a barrel manufactory.

4706. Is their system of manufacturing barrels the same as ours?—About the same.

4707. Do they roll the barrel?—In the private manufactories they do; in the Government manufactory they weld in the usual style.

4708. Do you know the reason why the Government pursue that plan?—I think on account of the cheapness of labour there.

4709. But the cheapness of labour would equally lead the private manufacturer to do the same thing, would it not?—I had no conversation with the officers respecting that particular subject, therefore I am unable to answer the question.

4710. Is the quality of the iron of which their barrels are made, the same as that of which ours are made?—Some is clear iron.

4711. Is it of the same quality?—Without testing it I could not say; it appeared free from greys and flaws, good clear iron.

4712. Mr. *Dundas.*] Do you know the price of that iron per ton?—I do not.

4713. Colonel *Boldero.*] You think that our rifle is unnecessarily finished?—So far as the service is concerned.

4714. You are aware, are you not, that the finish regulates the price?—Certainly.

4715. Do you think that if we lower the quality, the usefulness of the arm will not be diminished?—Yes; but it is very difficult to draw a line how far to go.

4716. Still it is your opinion that if the quality was lowered its usefulness would not be diminished?—So far as external finish goes.

4717. Can you form an idea of what the cost at Enfield would be to send out a similar Minié rifle to those that you saw in Belgium?—I should think from 2 *l.* to 2 *l.* 5 *s.*

4718. The price of the Belgian rifle is 42 francs, and ours would be 2 *l.* 5 *s.*?—I think so.

4719. Can you say why the Belgian Government discontinued using machinery to a greater extent than they do now in finishing the stock of their musket?—No, I cannot.

4720. They had machinery at one time for stock-making, had they not?—So I heard; I saw nothing of it.

4721. Is not the rough stock nearly the same in price in both countries?—I should say so.

4722. They go to foreign markets, as we do?—Yes; it is about the same quality of stock supplied by the same manufacturers.

4723. Mr. *Newdegate.*] You stated that the Enfield view is stricter than the Belgian view?—I should think so.

4724. Are you aware that the Enfield view is not the same now that it was in 1851?—It is just the same, I believe.

4725. Are you aware that some written instructions were issued in 1851 to the viewers in Birmingham?—I do not know when they were issued. I am aware that they had instructions, or copies of the specifications for the supply of the various materials which they were to examine.

4726. Those were equivalent to written instructions?—Just so.

4727. Are those written instructions in force now?—For all that I know.

4728. Is the system of inspection the same now that it has been since the year 1851?—I believe so.

4729. You are not aware of any difference having been made in the instructions to the viewers?—I am not.

4730. You stated, did you not, that the private trade in Belgium roll their barrels?—Yes, I did.

4731. And the Government do not?—They do not.

4733. But you stated that you were not aware of the comparative value of Belgian iron when compared with English iron?—I did.

4733. Therefore you can state no opinion as to whether the English iron is better adapted for rolling than the Belgian iron?—Certainly not; one iron would roll equally well with the other.

4734. You are not sure whether the quality is the same?—I am not.

4735. How long have you been appointed inspector?—I am not an inspector.

4736. What office do you fill?—I am superintendent of the Royal manufactory of small arms at Enfield.

4737. How long have you been associated with the committee on small arms?—Nearly from the commencement of its being appointed, about 1841.

4738. Mr. *Muntz.*] Were they established for the purpose of looking into the principle of the Minié rifle?—Yes.

4739. With respect to iron, do you think, from your experience, that rolling instead of forging makes the slightest difference with respect to the prejudice of the iron?—From the experience I have had, I should think not; I believe you have burst from rolled than from forged.

4740. When you are manufacturing by welding, about four inches are heated at a time, and there is a minute between every heat; when the iron is heated for rolling, it is heated all at the same moment, and done at the same time?—Yes.

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4741. Do you find the forged iron stand a better proof than the rolled ?—Yes; but we have not welded for a long time.

4742. Can you recollect what the proof was when you welded them ?—About five per cent.

4743. Now you find it about what ?—It is a very rare occurrence; one in 1,000 perhaps.

4744. Did you ascertain when you were in the Netherlands what the proof is for a barrel ?—I am not aware of the charge of powder that they use; the last witness had a long conversation with the officers, and gained a great deal more information than I could.

4745. If the proof of a gun is much higher than another proof of a gun, it must be impossible to manufacture it at the higher proof at the same rate as the lower proof ?—Certainly.

4746. You stated just now that you thought the Belgian gun was a very sound and serviceable gun, and as sound and as useful as ours ?—Yes, I did.

4747. Then if we were to make our gun just such another as the Belgian, it would reduce the price about 1*l.* per gun ?—Yes.

4748. Do you think that it would be as good for all useful purposes ?—I should, but it is difficult to reduce down the standard of the work, and to draw the line where to stop. By leaving the work perfect at all points, the essentials are more likely to be correct. I consider the inside of the barrel one of the most essential points in a gun. I do not consider that is any too strict in the view, and I would not give way one bit in that. As to the outside, it is possible that it would not affect the efficiency or shooting of the arm, if not stuck up quite so true; at the same time there is a better stroke of work, and we are putting into the hands of the soldier a superior gun, both in workmanship and essentials, and in the appearance of it.

4749. You were speaking of the Belgium guns, and you said that their sights were much less expensive than ours ?—Yes.

4750. That would make some difference in the price of the gun, would it not ?—Yes, with our present sight, but it would not be more than 1 *s.* 6 *d.* difference.

4751. As to the break-off, did you examine any of them ?—Yes, I did; they were well fitted, and good square work.

4752. Would they answer all the purposes as well as the plan adopted in this country ?—So far as that is concerned, that is a question for a military man, and not a mechanical man; I am not in favour of the break-off.

4753. That is as to taking the barrel in and out of the stock; but as to the soundness of the work, and the durability of it, you are more capable of judging, are you not; for instance, it is important that the lock should fit well ?—Yes.

4754. Whenever there is a strain upon any part of a gun those parts which are well fitted must stand the greatest strain; if the gun was fitted with a break-off would it be fitted as firmly as now ?—Yes.

4755. But it would be very troublesome, would it not ?—It adds to the expense. The break-off question was settled before I came to the work.

4756. What would it add to the expense ?—From 4 *s.* to 4 *s.* 6 *d.*

4757. That would increase the price of our guns again as compared with the foreign gun, would it not ?—Yes.

4758. You think that at that rate it might be fitted so well that there would not be any variation in it ?—The break-off, I think, is better calculated for bolted guns than for banded guns; the bolts assist in holding the barrel up to the head, and firm in the stock; whereas the bands merely clinch it to the stock.

4759. Did you see any of that machinery that is used to make stocks in Belgium ?—No, I did not.

4760. Do you know whether their barrels are turned ?—Yes, they are.

4761. The same as in this country ?—Not quite; nearly so; they are turned by a self-acting lathe.

4762. Do they do anything with them afterwards ?—They are ground very well, not merely wiped over, without reference to being straight or crooked.

4763. You saw the welding done, did you not ?—Yes.

4764. Is that done in the same way as in this country ?—About the same.

4765. Could you judge of the nature of the iron ?—My impression was, that the iron was not so good and tough as our own.

4766. In

4766. In the cold state, or the hot state, how did you judge of it?—From the cracks in bending the skelp round while it was hot.

4767. Do you know anything about the strictness of the view in Birmingham? Very little.

4768. Do you know whether it is now different, or has been different, from any of the views at Enfield?—I believe the system laid down is the same, under the same head; the inspector directed Enfield, as well as Birmingham, and the Tower too.

4769. With respect to the Belgian musket, do you think that the Belgian musket is as good in workmanship as those made for the Board of Ordnance formerly?—As sound and as firm.

4770. I am alluding to the old percussion musket; is the Belgian musket any better than that was?—No.

4771. Is it as good?—Nearly so.

4772. You think, do you not, that if the work was done in the same way here as in Belgium, a greater quantity of work would be done?—Yes.

4773. Hitherto, and for some time past, the work has not been received in this country so low in quality as that in Belgium?—The construction is different; the present gun was constructed under very different circumstances; we were limited to weight, and therefore the gun is constructed to meet a certain given weight in every part.

4774. Do not the Belgians limit their weight?—Theirs is heavier, and they have a larger bore.

4775. Mr. *Monsell.*] Do not all the Belgian guns weigh the same?—Yes, I should think they do; they are close to the jig and gauge.

4776. Mr. *Walpole.*] You stated, did you not, that the great difference between the Belgian rifle and our rifle is in the finish, and not in the quality?—It is more in the construction, so far as cheapness goes.

4777. You state that the Belgian rifle would be as serviceable and as durable as the English one?—I do.

4778. Then supposing that the finish of the rifle in this country was not so complete as that of the Belgian rifle, what would be then the difference of price between the rifle made in this country and the one now made?—You might reduce it, I think, from 15*s.* to 10*s.*

4779. In comparing the Belgian rifle with the Ordnance rifle, you are in fact comparing two things that are not similar?—They are not.

4780. Would the services in this country be satisfied with an inferior weapon to what they have had before?—Probably the soldier would.

4781. Would no complaints arise from the gun being of a less perfect construction than it had been before?—Whether the barrel is struck up to a very high finish, or moderately, I do not think that the soldier could ascertain.

4782. The great advantage that you propose to gain would be, not in having the weapon made by machinery, so much as getting the weapon cheaper, in consequence of the finish and the construction being less complete than it is now?—I can only judge by seeing the arm produced. If it is produced by machinery equal to this (*pointing to a gun*) it would be the same.

4783. Probably you mean, when you say that it would be equal, that it would be equal in quality and durability?—Yes.

4784. Do you mean that it would be probably equal in finish?—Yes. I can only judge of a gun by seeing it. If I had seen an American gun, or any other, produced by machinery, I should be prepared to give you an answer.

4785. According to the evidence that has been given to this Committee, none of the arms which have been made by machinery have been equal in finish or construction to those made in this country. With respect to the advantage that you propose to gain in the price of the new rifle, made like the Belgian rifle, would it not, in point of fact, end in this, that you would have a less finished and a less well constructed arm than the present?—I can judge of that only by seeing a gun that has been made by machinery.

4786. Colonel *Dunne.*] The decision as to the kind and quality of the arms is made by the Board of officers, is it not?—The pattern is submitted to them for their approval.

4787. Do they decide how highly finished and of what quality it shall be?—They generally adopt the pattern submitted to them.

4788. The soldier has nothing to do with it?—Nothing at all.

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4789. Do you think that to obtain a pattern equal to that which has been decided on by the officers, you could dispense with any of those things that you have at present?—Not so far as the things are concerned that are carried out at Enfield.

4790. Do you think that an arm with less finish would be equally efficient?—Yes.

4791. But you are not to decide that; the Board of officers do that?—Decidedly.

4792. Colonel *Lindsay.*] You state that 15 *s.* could be saved in the expense supposing the arm to be less finished?—Yes; if we reduce the finish of this arm to the same style that is found generally in foreign arms I think it could be.

4793. In what part of it would the 15 *s.* be saved?—In the barrel perhaps 1 *s.* or 1 *s.* 6 *d.* The lock would not be so close jigged or gauged so closely, and hardly so tastefully filed; so much depends upon the taste in the filing of the main-spring, the filing up of the scear-spring, and the squareness of the work put there. The lock might be produced equally as serviceable, perhaps for 7 *s.*, so far as the service went, but it would not be of that high standard of workmanship. The gun could be stocked cheaper, but you could not inspect it so severely.

4794. You state that 1 *s.* 6 *d.* might be saved on the barrel?—Yes.

4795. What would you save in the stocking?—You might save perhaps 2 *s.* 6 *d.* in the finishing of the gun. Every part in this plate (*pointing to the gun*) lies flush with the stock; if the edges were different, and the lock-plate sunk in, and not made so close to the finish of this; for this occupies time, and is more costly; and the guard that lies in here, if it did not fit so particularly, it would not affect the service, but the workmanship would not be of that high standard of finish; and the same may be said all the way throughout.

4796. As regards the lock, do you think that a lock less highly finished would last as long?—Just the same, if fitted as well.

4797. Is not the fitting connected with the completing and the finishing?—Not entirely; there is the filing up of each limb; you must construct the lock a little different.

4798. You would alter the construction of the lock, would you not?—Yes, slightly.

4799. How would you do that?—I would have more room between the parts.

4800. That would, of course, depend upon the Board of officers agreeing to an alteration of the lock?—If it was determined upon to make to make the arm less costly, but to imitate the present one as near as possible, I should certainly alter the construction of the lock slightly to give more room; you might employ a class of workmen not equal to those at present employed upon the lock; you must employ lock filers of the highest class now.

4801. You think that the principal saving would be more in the exterior than in the interior?—Yes.

4802. Mr. *Geach.*] You are practically acquainted with the gun trade, are you not?—I do not know the gun trade, but I am acquainted with the manufacture of arms in the Ordnance establishment.

4803. With regard to the manufacture of the gun; you know all the parts of that practically, do you not?—I think so.

4804. Supposing you were told by an engineer who had never seen a gun made in his life, or even by an engineer who had seen guns made, that all the processes that are now carried out by hand labour, or at least a very large number of those processes, were to be superseded by machinery; and if you came to Enfield, or elsewhere, and erected a manufactory, even costing 150,000 *l.*, that you would be able to turn out 100 guns per day at the end of 12 months, and at the end of one year after that 500 guns a-day, and that the cost should be under 20 *s.* per gun, would you have any confidence in such a proposition?—That would depend entirely upon the gentleman that it came from, and upon his knowledge of machinery. I am no machinist myself, and I should require to be informed of the nature of the machinery that he was about to propose. I could give no opinion as to what would be the cost of the thing to be produced by the machinery, being unacquainted with the machinery that he was about to manufacture arms with.

4805. Have you seen the adaptation of machinery to any extent to purposes where hand labour was used before?—I have seen generally machinery

in

in engineers' places, and in manufactures, and I have seen block-cutting at Woolwich, and a great deal of machinery there. I have been at Portsmouth once.

4806. With regard to the substitution of machinery for hand labour, do you not think that it is a question of time only, and that before it can be done there will be a great number of trials and failures?—As to the question put by the Honourable Member, I have been informed that there is a great quantity of machinery employed in America in the manufacture of small arms, and if it is the fact that machinery is in existence in America, and that the arms there made are correct and good, I cannot but believe that it can be done here, but not having seen the arms made there, I cannot answer the question.

4807. Mr. *Muntz.*] You never saw an American gun?—No.

4808. You cannot form an opinion upon the subject if you have not seen an American gun?—No.

4809. The question is this, with regard to the Belgian guns, whether you are able to say that, in your opinion, a similar gun could be made in London or in Birmingham, and whether it could be made at the same price?—The labour is so cheap there that I should think not.

4810. Mr. *Newdegate.*] As a practical viewer I would ask you this question, may not the viewer view so strictly as to enhance the cost of any weapon?—It is possible to do so.

4811. In the amount of the finish depends the cost of the weapon?—Entirely.

4812. After the first point, that of the serviceability, has been attained?—Yes.

4813. Then if the view be overstrained, the cost must increase in proportion?—Certainly.

4814. Do you think that an equally serviceable arm can be made at less cost, by reducing the finish required?—So far as service goes.

4815. Then if your instructions as a viewer were to view for service, but so as to admit of cheaper production, you think that arms could be produced equally serviceable but cheaper in England?—I have no instructions contrary to that from the Board of Ordnance. I have merely followed in the same train that I have been instructed generally, under the chief; I have followed on in the same way. We made the pattern. With the Minié pattern, the object has been to put the best arm into the hands of the British soldier with as high a finish as is consistent with the price.

4816. You have viewed up to the pattern?—Yes.

4817. And that pattern is of a very high finish?—It is well finished.

4818. So highly finished as to justify the present cost?—I think so, taking into consideration the commencement of the order.

4819. You think that a serviceable arm at a less cost can be produced, but then the pattern must not be of so high a finish as the present?—Yes; so far as the service goes, if the stock were left from the stocking, it would be serviceable; it would not be so sightly, but it would be cheaper.

4820. The Belgian gun is cheaper, is it not, in consequence of its not being so highly finished?—It is somewhat in the finish, but more particularly in the construction.

4821. Do you think that the construction of the Belgian arm admits of its being made more cheaply?—It does.

4822. Then it is in consequence of the construction of the English arm in a great measure that the price is high?—Yes, there is not so much margin in this arm.

4823. Mr. *Muntz.*] Should you if you were viewing the Minié rifle, pass similar barrels to those that are now made in Belgium?—So far as the inside is concerned I think I should; not the outside.

4824. With regard to the locks, what do you think of them?—They are good.

4825. As good as ours?—Not quite so highly finished; they are sound, and act as well, and I think they are nearly as well fitted.

4826. Do you think that you should pass such locks?—If I viewed under the instruction of taking a sound gun.

4827. But under the present instructions, should you take locks of the same construction as those that are made in Belgium?—They would not pass the view in this country.

4828. You have viewed some of Colonel Colt's pistols, have you not?—Yes.

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4829. Were they viewed up to the pattern?—Yes, I took his sample as the pattern.

4830. Do you know how many parts there are in that pistol?—No, I do not.

4831. You considered it a complicated arm, did you not?—I considered it the best revolver that I had ever seen; it shoots well; it is a very effective weapon, and most of the parts are well got up.

4832. What is your opinion as to the workmanship in Colt's pistols as compared with that in the Minié rifle?—I consider the barrel got up as well as the other barrel; the rifling and the cylinder are got up as well, it is good work, bored clean and accurate to the plug, and turned and finished in a workmanlike manner; the pistol has a lever rammer attached to it, which is very clever, and adds very materially to the efficiency of the weapon.

4833. Taking the whole, the lock and the fitting, what is your opinion of it?—The lock is not so good; the finish is not quite equal to the Minié.

4834. Have you ever made the experiment to see whether, if the different parts were thrown together indiscriminately, they could be put together without sorting?—I have not.

4835. From your viewing of them, what is your opinion upon that point; do you think it is possible?—I do not imagine that if you mixed half a dozen together that the whole of the parts would fit; but you would have to find the same parts, particularly as regards the barrel, and the chamber, and the stock to go together.

4836. It has been stated that if they were mixed in a bag, the parts would fit together without sorting?—I think that that had more reference to the interior of the lock, such as the mainsprings and the bolts.

4837. To those parts most liable to be interfered with?—Yes.

4838. Do you think the result would be that they could be put together in that way?—They would require a little adjusting.

4839. Have you been to Colonel Colt's manufactory?—Yes, three months ago, but I did not see the manufactory to great advantage, as it was on a Saturday, and they were not fully employed.

4840. Did you notice what proportion of machinery, and what proportion of hand labour was employed?—A very much greater proportion of machinery than hand labour.

4841. What was the proportion?—That I am hardly able to state. I had only a cursory view. I saw beautiful machinery there, well regulated and adapted for making revolving pistols.

4842. I suppose you would not pass such work as there is in those pistols in rifles?—No, not in the lock; certainly not.

4843. Lord *Seymour.*] Did you see any machinery in Belgium which you thought you could with advantage introduce into Enfield?—There was very clever machinery employed, but it was principally in the break-off, and consequently as our arm is not a break-off arm, we could not introduce it.

4844. Did you see any machinery in Belgium which you would wish to introduce into Enfield?—Yes.

4845. What was that?—The rifling machinery.

4846. In what way do you rifle at Enfield?—Upon the same system that has been for a long time in use, with a cutter, cut with teeth something similar to the French; the machine is worked backwards and forwards by a man, and it is very laborious work.

4847. It moves along a frame, does it not?—Yes; in some instances a rod is worked through a cylinder, with a lathe to guide the rod; the method of cutting rifle barrels by machinery at Enfield will only admit of cutting grooves that are horizontal; it is more filing the metal away; the machinery that I saw in Belgium cut with a single tooth, and planed the barrels out; it was under perfect command, and cutting the grooves equal in depth, or progressive in depth; it was altogether a superior machine, and cheaper, easier of application, and more mechanical.

4848. Do you know where their machinery was made?—I do not know; there were a number of them; I think at least 20 in a row.

4849. Did you see any other machine which you could introduce with advantage into Enfield?—I cannot say that I did; they employ about the same quantity of machinery that we do.

4850. Did

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4850. Did it appear to you that their machinery was of a superior character to yours?—About the same description.

4851. Mr. *Muntz.*] Did you try any of their plugs?—I did.

4852. Did you see how near they worked?—They fitted well.

4853. Did they work as near as we do?—What I tried appeared to be as near; the barrels plugged well.

4854. Colonel *Lindsay.*] Is there not some difference between the fitting of the Belgian firelock and the fitting of ours, as regards the three component parts, the barrel, the stock, and the lock?—It is of a different construction.

4855. Will you explain in what particulars the two locks differ?—One has the side action, and the Belgian has the back action; the mainspring lies behind.

4856. Is not the lock fitted to the barrel, and not to the stock?—Yes.

4857. It is fixed in the barrel, is it not?—Yes, to the break-off.

4858. What is your opinion as to that mode of putting the musket together?—For back-action guns it is a very good plan.

4859. Would not that be an improvement for the swivel lock?—It is a swivel lock.

4860. As to the lock that we are now using, might it not also be done?—No, you must alter the barrel and the lock altogether to do so.

4861. Mr. *Newdegate.*] Do you think that if a musket with the break-off was taken by the muzzle and the stock sunk in some hard substance, it would stand as heavy a blow as that with the tang in?—Yes, I do.

4862. In order to make it, you would have to go to considerable expense in the construction of the break-off, would you not?—Yes, and it is on account of the expense that I object to it.

Martis, 28° *die Martii,* 1854.

MEMBERS PRESENT.

Mr. Monsell.	Lord Seymour.
Mr. Muntz.	Colonel Boldero.
Mr. G. Dundas.	Mr. Newdegate.
Mr. Walpole.	Colonel Lindsay.
Mr. Geach.	Colonel Dunne.

WILLIAM MONSELL, Esq., IN THE CHAIR.

Mr. *James Gunner,* called in; and further Examined.

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4863. Lord *Seymour.*] WHEN you saw the Government manufactory of arms in Belgium, were all the operations conducted in one building?—So far as I saw it appeared to be not one shop, not one building, but various buildings, such as welding shops; they were attached to each other.

4864. Were the whole of the buildings, from the commencement of the manufacture to the conclusion, adjoining each other?—It was in a sort of square.

4865. So that the iron work and the wood work were brought into the square, and the perfect gun produced from the materials so brought in?—It is my opinion that it was so.

4866. Are you certain of it; did you go through the whole establishment, so as to form an opinion whether or not the iron was brought in, in one part in a rough state, and worked up in the building for all the purposes of the lock, the barrel, &c., and the wood also brought in and worked up into the stock?—Yes, I did.

4867. It was done so?—I think so, with the exception of the smaller materials.

4868. They were not made there?—I do not think that the bands were made there.

4869. Were the bayonets made there?—Yes.

4870. Was the bayonet made entirely of steel, or partly of steel and partly of iron?—Partly of steel and partly of iron.

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4871. Is it as good a bayonet as the bayonet that was adopted in 1853 by the Board of Ordnance?—I did not think it so well constructed.

4872. With respect to making the patterns; where are the patterns made here when an arm is decided on by the committee?—Invariably at Enfield.

4873. Do you only make one pattern; there has been a complaint made to the Committee that only one pattern is sent down to several manufacturers?—We make one for ourselves, a duplicate for the Tower when it was going on, and a duplicate for Birmingham.

4874. You send only one for all the manufacturers?—Only one as a guide.

4875. Before a pattern is adopted by the committee, are you consulted as to the probable price at which it can be made?—I am always consulted upon all points, and questions as regards the price are asked me.

4876. When the alterations were made in the different parts of the musket in 1853, were you consulted as to the increased price that those alterations would occasion?—Yes.

4877. Did you give the committee your opinion that the alterations, though comparatively small, yet were of a kind that would considerably raise the price of the arm?—Yes.

4878. With regard to the bayonet being made partly of steel and partly of iron, did you ever consider whether or not making it entirely of steel would reduce its price and facilitate its manufacture?—That has been a question proposed to me. I see no objection to making it entirely of steel. The present mode of making it is with an iron socket, with the view of decreasing the price.

4879. Have you ever tried at Enfield to make a bayonet entirely of steel?—I have not.

4880. The patterns are made there, are they not?—Yes.

4881. What portion of the musket is made at Enfield?—The barrel is made there. We have hitherto had them supplied in the rolled state from Birmingham, but we now roll them ourselves.

4882. How long have you rolled them at Enfield?—Within a few days.

4883. You can hardly be said yet to have completed a musket?—No.

4884. You have now commenced the rolling?—Yes.

4885. It was stated that you had taken away a roller from some contractor at Birmingham?—Not unfairly.

4886. From whom did you obtain the roller?—He made application himself and offered his services to come to Enfield. I have his letter in my pocket.

4887. He first offered his services, and you entered into an agreement with him?—Yes.

4888. Did you, before that, communicate with the person in whose employment he was?—Not the barrel-master.

4889. You did not give him an opportunity of looking out for another person as quickly as he might?—The barrel-roller assured me that it was his intention to leave his master, whether he came to Enfield or not, and that he had given him notice of his intention to leave.

4890. Now that you have machinery at Enfield, for the purpose of manufacturing barrels; with the machinery that you have at present what number of barrels can you make in a month?—I think we are about equal now, taking the whole parts, to about from 200 to 250 a week.

4891. For the purpose of making barrels, you have all the machinery and dies that are required at present, have you?—I believe so.

4892. You having seen the manufacture at Birmingham, believe that your machinery is in every respect as good?—Yes, as at Birmingham.

4893. With regard to the locks, what portion of them do you make at Enfield?—We make them complete from the materials: from the iron and the steel.

4894. Do you forge them in dies?—The lock is forged, not in dies, but the expense is so small in forging the lock, and it is so nicely forged, that I do not think that there would be much saving in forging the lock in dies.

4895. You do not anticipate any great saving in the making of locks by the application of machinery to that portion of the manufacture?—Not by stamps; we have always forged them by hand labour and tools; they use tools, the forgers do.

4896. You having had experience of that fabric for many years, think that hand labour, and the use of tools, are better than the adoption of dies and cutting out by machinery the different parts of the lock?—We use tools all throughout the lock.

4897. You have seen the work done at Colonel Colt's manufactory, have you not?—Yes.

4898. Have you seen the way in which he makes the different parts of the locks?—Not particularly the lock; I went on Saturday, and they were not in full work; the frames of the lock I saw done, and I should say that that was the best method of producing that description of lock.

4899. For producing the lock required by the Board of Ordnance you think, so far as I can understand you, that the present system at Enfield is as good as any system that you can adopt?—I do not say any system, but any system that I have seen adopted.

4900. You have seen most of the systems which have been adopted in this country?—I believe I have so far as military work is concerned.

4901. You saw the system pursued in Belgium; do you think, as regards the lock, that there is any advantage to be gained from what you have seen in Belgium?—Not the slightest; it is filed similarly in every way, and by the same method; it is forged in the same way and filed in the same way.

4902. Do you look forward to any great reduction in the price of the lock?—That depends entirely upon the machines to be invented to do the work.

4903. That depends upon machinery that is not yet invented?—Yes, that I am unacquainted with.

4904. When you make bayonets at Enfield, have you lately introduced any machinery for making them there?—We do not manufacture bayonets in the ordinary way; they are supplied by contract.

4905. You never make bayonets at all?—Only as patterns.

4906. Then of course they are made by hand?—Entirely, so far as the forging and the grinding are concerned.

4907. With regard to the stock, at Enfield, you have a particular way of seasoning the wood, have you not?—Yes, when it is wanted in an emergency.

4908. Has that system been found to answer?—Yes.

4909. Have they adopted that system in Belgium?—No; they steam their stocks, they dry them by steam.

4910. You do not think that system so good as that pursued at Enfield?—It has not been considered so in this country.

4911. How many stocks can a man make in a day at Enfield?—Our work is distributed differently to what it is in Belgium; a man will stock from eight to ten guns a week; that is, he will take the stock in the rough state, and let the barrel in, and the lock, and round the gun up, and put the bands in about eight or ten a week, the present style of gun; it is not finished then; it is then screwed up, and the mounting is then let in by another man; it is distributed amongst a number of hands with the view of facilitating the operation, and that one man should not be employed using many tools; that there should be no confusion of tools.

4912. How many men are employed on the stocks, and how many stocks are produced in a week?—I average about a gun a man complete in all respects. If I wanted to get up 100 a week, I should employ 100 men, and they would have boys under them.

4913. Do you think now, that in the stock a considerable saving may be introduced by employing machinery?—If machinery will do the stocking, there is a fair margin for saving; it is very high.

4914. When you were consulted by the Committee of the Ordnance upon the new rifle of 1853, did you give the Committee any notion from your experience of what would be the probable price at which it would be obtained?—I did; to the best of my recollection I answered all the questions that were put to me, and I feel satisfied that I entered into the matter with Colonel Gordon and the Committee generally, when the pattern of 1853 was constructed. We were limited to weight, and we were limited to length, and we produced, so far as we could, the best possible gun, the strongest and the most durable with the slightest weight. I believe that every part of the pattern of 1853 is equally well proportioned; there is no weak point in it. I do not know one that I could strengthen with regard to its weight.

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4915. Do you think that the mode of connecting the barrel with the stock with an iron ring, a screw, and bands is the best system?—Yes, it holds the barrel firmly in the stock without weakening the stock, and binds the barrel and stock together. I think that it is much stronger than the bolt.

4916. You think that it is better made of iron than of any other metal?—Yes, the band; it is tougher.

4917. As you gave your opinion to the Committee, will you state now at what price you thought that the contract would be taken at first for the entire musket when completed?—I do not remember ever stating the price that it would be taken for by contract, but when the gun was set up in the Royal manufactory, I have a recollection that the cost was put to me, but I have no record of it; it was a mere matter of conversation.

4918. It was an increase of price, as compared with the pattern of 1851?—Yes, the principal increase would be in the construction of the bayonet; it is much lighter.

4919. You cannot remember what you stated would be a fair allowance for the increase of cost proportionate to improvements in the musket?—No; I do not remember that.

4920. Colonel *Boldero.*] You were asked about the seasoning of the stocks at Enfield; are not the stocks, when they are once bought, delivered into the store at Weedon, with windows on each side, so that a current of air may pass through; and do not the stocks remain there a year or two before they are issued to be set up as muskets?—They are in some instances; we have resorted to the present method of desiccating gun stocks when they have been required on an emergency; the stocks are received here as cut from the plank nearly green, and they would take three years to season in the ordinary way; but we have adopted a new method that has been lately introduced of seasoning timber by means of hot air, and by which means we can use the gun stocks in from a month to five weeks, instead of waiting two or three years.

4921. Have you any knowledge as to the number of stocks in store at Weedon?—Yes; there are about 100,000 at Weedon, and there are at Waltham a large store.

4922. How long have they been purchased?—I think that the last contracts that were viewed, and which are there now, were about two years ago.

4923. Then the stocks have been seasoning all that time?—Yes; we have only seasoned them by hot air, when they have been wanted on an emergency.

4924. With what power do you work your machinery at Enfield?—About 45-horse power of water.

4925. Is it entirely water?—Yes.

4926. What power was used in Belgium?—I did not ascertain that.

4927. Is there any difference in the working of machinery by water as compared with steam?—I should think that the advantage is with steam.

4928. Why do you think so?—You are able to regulate your engine better.

4929. Is it not the fact, that all heavy work is better done by water power, and lighter work, when you wish for a quicker rotation, is better done by steam?—Not that I am aware of.

4930. Is it your opinion, that there is a supply of water running to waste at Enfield, which is in accordance with what Mr. Lovell stated in 1852?—There is, particularly in some seasons of the year.

4931. Is your supply regular and uniform?—Generally so.

4932. Are you ever stopped for want of water?—Very seldom.

4933. Supposing funds were provided for building extra premises, supplying the machinery, and procuring additional workmen, what number of muskets could you turn out at Enfield in 12 months, all hands being employed?—With our present power I should think we could do from 15,000 to 20,000 a year.

4934. What has been the largest number that you have turned out there since 1840, in one year?—About 6,000.

4935. Have you not turned out 25,000?—Never.

4936. Do you think that, if Enfield was increased by having a large vote from Parliament, giving you extra premises and machinery, and everything you want, you could not turn out more than 15,000 muskets in 12 months; is there not a capability at Enfield, supposing the establishment increased, to turn out 50,000?—So far as the land goes.

4937. Would not the water do it?—We must have steam.

4938. Mr. *Muntz.*] What water-power have you?—Forty-five horse power.

4939. Do you employ steam now?—No.

4940. What is the 45-horse power employed upon then?—Principally barrel work.

4941. For boring and turning?—Yes.

4942. And rolling now?—Yes.

4943. How many boring benches have you got down?—Three double sets of fine boring benches, and four double sets of rough boring benches; eight benches.

4944. You say you can only turn out 6,000 a year?—We could do more, but we have other work to do; our shop room is occupied; for instance, we were percussioning and altering barrels from flint for extra service at the rate of from 1,200 to 1,500 a week, and we were also percussioning a number of barrels for the Line service.

4945. Supposing you had an increased quantity of shop room, what would be the number of guns that you could bore, and turn out finished ready for stocking at Enfield?—We might erect machinery to do 1,000 a week there.

4946. With your present machinery, what number of barrels could you make with the mill power that you have?—I think 250 a week.

4947. Colonel *Dunne.*] By devoting the whole of the power to that purpose?—Yes, that is my opinion.

4948. Mr. *Muntz.*] Is there more water at Enfield than is used for your present works?—Yes.

4949. Is it capable of being increased?—Yes.

4950. Do you know what the size of the wheel is now?—The wheel is, I think, nine feet in width, and 18 or 20 in diameter.

4951. Is it overshot or undershot?—It is a breast-wheel; we have two water-wheels.

4952. Do they both work at boring?—Yes; one at rough boring and grinding, and the other at fine boring.

4953. How long have you been turning the outside of the barrels there?—Ever since I remember.

4954. They used to be ground, did they not?—Not in my recollection, without being turned.

4955. Both the wheels are now working at the same work, boring and turning?—Yes; they are employed also in percussioning and general services.

4956. How many hours do you work a day?—At piece-work the men work from six in the morning till half-past eight at night.

4957. Is it all piece-work?—Principally in the manufacture of arms.

4958. Is the place now so situated that an additional quantity of water-power might be used in conjunction with your present power?—Yes; there is water-power running to waste now.

4959. Could an additional wheel be put in to act in concert with the others?—That I am not prepared to say.

4960. You make locks there, do you not?—Yes.

4961. What quantity in the year do you make?—About 100 a week.

4962. Could you stock any more than the quantity which you now make?—Not with the various services that are now going on. The shop room is pretty full; it is taken up a great deal with repairs.

4963. Did you say that your shop was full?—Yes.

4964. Can you tell what loss there is in the drying of the stocks?—With regard to the moisture that evaporates, that depends upon the state that the stock is in, whether it is green or partially seasoned; they average from 2lbs. to 3lbs. loss during the time.

4965. What was the original weight?—Sometimes about 11lbs., and they are reduced to 8 ¼lbs. or 9lbs.

4966. That is a loss of about 2¼lbs.?—Yes; we have not been desiccating stocks for some time; it is only at times that we do it, when they are required in a hurry.

4967. If they are reduced in weight, they are reduced also in dimensions?—They are always sufficiently large; I think no more so than in the ordinary way of seasoning.

4968. Have you never made more than 6,000 stand of arms a year at Enfield?—I think that is the average.

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4969. Were those Minié rifles?—Yes; we made 5,000 then; that was the only order that we had, and I produced them when they were required at the rate of 200 a week for six weeks right out; that was upon the finishing of them.

4970. Could you do that if you did nothing else during the year?—Yes; this was the completion of them; they could get none anywhere else; by extra exertion we produced that number in five weeks.

4971. The materials were supplied to you, were they not?—Yes.

4972. How does your water wheel lie with regard to floods?—We are occasionally tailed up with floods.

4973. Mr. *Dundas.*] What system of viewing is enforced at Enfield?—I believe it to be just the same as in London or Birmingham; it has always been conducted under one system, and it is under my superintendence.

4974. In the event of the viewer entertaining a doubt, does he come to you?—Always. I am in the view room constantly to arbitrate between the workmen and the viewer, and between the viewer and the Board.

4975. Lord *Seymour.*] Do you find by that arbitration which you exercise in that way, that you give satisfaction generally to the workmen?—I consider so; there has been no appeal to the head office, or to Mr. Lovell, the head officer, in his visits there.

4976. Mr. *Monsell.*] Is there exactly the same system of arbitration at Birmingham?—I believe so.

4977. Mr. *Newdegate.*] You do not know that?—They have a head viewer there, who should act, I believe, in the same capacity as I do at Enfield; I am not aware of the view at Birmingham.

4978. Mr. *Dundas.*] In the event of its being considered desirable to increase the number of workmen at Enfield, would there be any difficulty in doing so?—Enfield is not a locality for increasing the manufacture beyond a certain extent; in my opinion, the accommodation for houses is very difficult; we have no neighbourhood, more particularly, for skilled workmen; I do not think that it is so good a locality as the site which the Government have fixed upon.

4979. The power is water power, is it not?—Yes, we have water power to the amount of about 45 horses.

4980. What amount of steam power have you?—None.

4981. Mr. *Monsell.*] What is the nearest village to Enfield?—Waltham Abbey, about two miles distant.

4982. What is the population of that village?—I do not know; 4,000 or 5,000, I think.

4983. Do you know of any other village that is within two or more miles of Enfield?—Ponders End and Enfield Town.

4984. How far distant are those?—Enfield Town is about four miles and Ponders End about two miles.

4985. Colonel *Boldero.*] Have you travelled much in the manufacturing districts?—No; I have been to Birmingham.

4986. Do you think it possible that a gentleman engaged in commerce, and erecting a mill three miles from a town without habitations round it, could, in the course of six months, have that mill full of artizans and labourers, men, women, and children?—Where skilled labour is employed they would get them round, perhaps, and parties would erect houses upon speculation; but land is not to be got with us.

4987. If you required 500 additional hands, first-rate artists, and you undertook to find them in permanent employment, giving them good wages and the chance of a pension, do you think there would be any difficulty?—Yes.

4988. From what cause?—I find that workmen generally, who have been brought up in Birmingham, have a very great objection to leave their own town; and it frequently happens that after I have had men at Enfield for a month or six weeks they prefer going back again. Those men that have been brought up from boys are the most attached to a place.

4989. Mr. *Monsell.*] Suppose that your employment at Enfield were to be intermittent, and that you were to employ at one time, say 700 or 800 people, and at another time 300 or 400, what would become of the 400 or 500 when they were not employed at Enfield; would there be any other means of employing them?—Not without the Government had orders of the same nature in the trade.

4990. Mr. *Newdegate.*] You stated that there would be a difficulty in procuring a large additional number; what number did you contemplate when you stated that there would be a difficulty?—I think that it was mentioned to me, 500.

4991. But supposing the number were not so large as 500, do you think that there might not be found accommodation for 200 additional workmen?—I do not think that you could accommodate 200 in the neighbourhood without erecting further accommodation.

4992. Has the Ordnance no other land there?—Only our manufactory, and about six or seven acres running with it.

4993. Are there not several land companies who have bought land, and are building upon it in that neighbourhood?—No, not in the immediate neighbourhood.

4994. But at no great distance from it?—I think three or four miles off, as far as Cheshunt and Waltham Cross.

4995. It is the fact that companies are buying up land, and subdividing it, and using it for building purposes within three or four miles?—Yes, I think so.

4996. Mr. *Muntz.*] What quantity of land have you to spare at Enfield?—About six or seven acres.

4997. What is it used for now?—It is merely let.

4998. To graze?—Yes.

4999. Not for a permanency?—No.

5000. You stated just now that it was a difficult thing to bring workmen from Birmingham to locate them in other places, would not that remark apply equally the same whether you brought them to Enfield or to Woolwich?—I believe the intention is, that the manufactory at Woolwich is to be under different arrangements.

5001. They must procure workmen somewhere?—Yes, and the neighbourhood of Woolwich is better calculated for a manufactory; it is a town where they can get their provisions at a market, and live handy to their work.

5002. Is there any difficulty in getting provisions at Enfield?—No; still we are not within two miles and a half of a market.

5003. How are you paying the man for rolling your barrels now, by day work or piece work?—We have commenced day work.

5004. The man did not work at day work before, did he?—It is understood that, after a certain time, arrangements will be made for piece-work; at present we have made no arrangement.

5005. How much a day do you give him for day-work?—It is rather a high price at present, but it is only a temporary arrangement; he has 10 *s.* a day by a temporary arrangement.

5006. He is to have piece-work at what price?—At the same price as is paid in Birmingham.

5007. Do you know what wages he received before he came to you?—I think he had nearly 50 *s.* a week.

5008. You stated, did you not, that you made no communication to Mr. Millward, that you intended to take him away?—No, I believe there is an arrangement with the barrel makers, that if a man wishes to leave, he gets no character, and they will not allow him to go to another.

5009. How can they refuse him a character?—I do not know; they will not take one another's workmen; the man stated so himself; he came to me as a very respectable person to all appearance. I asked him particularly whether it was his intention to leave his master when he came to Enfield, and he assured me that it was; he is at Enfield, and if there is any doubt he can be examined.

5010. Is it the general practice of the Ordnance Department to take men from their masters without consulting them?—I can say that it is the practice with the contractors with regard to our own men; they never inquire of me, if they want them.

5011. You stated just now, in answer to a question put to you, that you thought that there would not be much saving in stamping the lock?—So far as the forging went.

5012. Have you seen any locks stamped?—Yes.

5013. What is the cost of forging now?—The labour now is 6 *d.*, and by stamping it might reduce it to 4 *d.*

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5014. Which would be the best article?—I think the forged work is the best.

5015. Which would require the most work afterwards?—Lock forging, I think, is as good; I do not think that you can improve it in any way, the springs especially, and the plates; the piece workmen work after the forger, and if there is the slightest portion left on that is unnecessary, the piece workman makes a complaint directly against the forger.

5016. You stated, I think just now, that in the case of ordering the materials for your guns, there was only one pattern given out to the trade; what is the reason for that?—I do not know the reason of it; it is not a matter that I have been called on to give an opinion upon; I have made the patterns invariably by the order of the inspector of small arms, and I believe that the pattern is submitted at the view rooms, and gauges taken from it, and duplicates.

5017. Supposing there are half-a-dozen contractors, and this one pattern is to be sent in turn to them, they must each either have it a very short time, or some one of them must be a long while before he gets it?—I never heard any complaints of the system in consequence of there being only one pattern.

5018. Do not you think that if there were six or seven persons to have one pattern, the consequence must be that the man who had it last, or the last but one, must be some time before he got it, if he got it at all?—For setting-up now there are so few employed, that I do not think there would be any inconvenience in it.

5019. How long do you think each man ought to have it?—A few days, merely to make his gauges.

5020. Is a week too much do you think?—I think that the whole number might make the gauges by acting in concert together; they might prepare their gauges, and two or three days would do, I think.

5021. How do you pay your turners and borers; are they paid by piece-work?—The borers are all, and the turner's work is not piece-work; it is done by a boy at 2*s.* 6*d.* a day, and he attends to two or three lathes.

5022. You have some one, have you not, to superintend the lathes and keep them in order?—We have a general machinist who looks to all the work, but his lad can make and sharpen his own cutters.

5023. What do you pay for boring barrels?—That is high, in consequence of not having full employment for the borers; we pay 5 *d.* for rough boring, and I do not think that too high for a small barrel.

5024. Have you ever made any precise estimate of the present cost of one of the Minié rifles?—Yes, I have.

5025. What have you found that cost to be?—I think 3 *l.* 4 *s.*

5026. What do the locks cost?—Including forging, filing, and incidentals, about 7 *s.*

5027. Do you mean 7 *s.* ready to go to the stocker?—Yes.

5028. Suppose that it was considered necessary to make an addition to the works at Enfield, do you think that there would be any difficulty in building small houses for the workmen?—So far as Enfield Lock is concerned there would; we have no land.

5029. You stated that there were six or seven acres?—That would be required for the workshops. I do not think that it would be wise to have the workmen's houses and the manufactory connected together.

5030. Do the men live in the manufactory?—No, they live adjoining to it; we have 60 cottages there.

5031. Do they pay rent for them?—Yes.

5032. Mr. *Newdegate.*] You stated, did you not, that one reason why you prefer Woolwich to Enfield is, because the workmen that you hope to draw from Birmingham to the new manufactory would prefer living in the town of Woolwich to the hamlet of Enfield?—It is for want of accommodation for so large a number of workmen.

5033. You stated, did you not, that the Birmingham workmen are exceedingly fond of their town; that they do not like Enfield, and you thought that they would like Woolwich better?—I think so.

5034. According to your notion, the proposed Government establishment would require the largest number of workmen to be procured from Birmingham?—That I do not know. I cannot enter into that matter.

5035. That was the consideration which suggested your answer, was it not?—No; not particularly that; but where a large quantity of labour, whether it be skilled

skilled labour or unskilled labour, was required, I say that there is a want of accommodation for a larger number than we have at present.

5036. When you stated that there was an objection on the part of the Birmingham workmen to leave their own town and come to Enfield, was that based on your experience?—Yes.

5037. You consider that they would prefer Woolwich?—Yes, I do.

5038. Of course, when you stated that the probable accommodation at Enfield would not be sufficient, your answer had reference to accommodation for some 500 or 600 men?—Yes.

5039. A smaller number would be more easily accommodated?—Yes.

5040. Mr. *Monsell.*] Supposing either that the Ordnance, or a land company, such as has been suggested, were to purchase land in the neighbourhood of Enfield, and by building a large number of cottages, drew thither a great number of workmen, and suppose also the demands of the Government to be very variable, that at one time they required to make 20,000, and at another 50,000 or 100,000, what would become of the labourers who were employed in making the larger number during the period in which only the smaller number were required?—In all probability they would be engaged at some other employment away from the place altogether.

5041. Would they find any other employment at Enfield —No.

5042. Mr. *Muntz.*] Would they find any other employment at Woolwich?—That I do not know.

5043. Mr. *Monsell.*] Are you aware that the number of workmen employed by the Government at Woolwich has been enormously increased, and that they have found no difficulty in procuring them?—Yes, I am aware of that.

5044. Mr. *Muntz.*] When you stated that you made 200 Minié rifles a week at Enfield, you did not make barrels at that time, did you?—Yes, we did; we did not roll them; they were supplied in the rolled state from Birmingham.

5045. And you then finished 200 a week?—Yes.

5046. Now, having rollers at work, you begin and finish the arms all the way through?—I believe that is the intention.

5047. Will you state whether her Majesty's Board of Ordaance, when they employ labourers, require a character with them?—I always have a written character with the general workmen.

5048. Did you have a written character with your roller?—No; but I was informed by persons who had worked with him, and knew him, that he was a man of good character; and I saw Mr. Millward the next day, and I could perceive from his conversation that he was a good, steady man.

5049. Mr. *Monsell.*] Do you consider, from what you have seen of him since, that he is a man of good character?—I believe him to be an excellent man.

5050. Colonel *Boldero.*] How long will the new musket last?—If used well, I think it will last 16 years.

5051. How many years was it calculated that the smooth-bore musket would last?—About the same time.

5052. And how many the flint musket?—I do not know.

5053. Are you not aware that they lasted 12 or 14 years?—Yes.

5054. Do you think that one of the regiments sent out to the East have taken with them muskets 14 years old?—No.

5055. What would be the annual supply necessary in times of peace, taking the army at 100,000, and the militia at 100,000, making 200,000; and supposing 100,000 employed, and the other 100,000 only for a limited period?—It is a matter that I have never been questioned upon or entered into.

5056. How many hundred muskets would want replacing in 12 years?—I cannot answer the question.

5057. Would the whole of them?—I think not.

5058. Mr. *Muntz.*] Have you made any comparison between the different muskets; the sea service musket, the extra service musket, and the present Minié rifle?—No, that has not been brought particularly under my notice.

5059. Have you heard any one give an opinion upon that subject?—I have not; it has never been brought under my notice.

5060. Colonel *Dunne.*] Would not the durability of the musket all depend upon the wear and tear it was exposed to; for instance, in active service it would be more likely to get knocked about than if not in active service; and is there any

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reason why it should not wear out in 12 years?—It depends upon the use that it is subjected to.

5061. Colonel *Lindsay.*] Have you got a Belgian rifle here?—Yes (*producing the same*).

5062. Are you of opinion that it would be a desirable thing that the English musket should be lowered in point of workmanship to the condition in which the Belgian rifle appears?—I do not.

5063. Mr. *Newdegate.*] You do not wish to see it reduced to that standard of work and finish, but at the same you think that a considerable saving might be effected, and as serviceable a musket obtained, at less than the cost of the Government pattern at present?—I believe that my reply yesterday was, that a gun set up of this quality and work would make a saving of about 12*s.* to 15*s.*

5064. That is, preserving the Government pattern?—Yes, but to have the quality of work that is in the Belgian rifle.

5065. Would not the saving be more?—I do not think so.

5066. As to the cost of production, have not the trade a great advantage in supplying the Government, because when the demand for the Government ceases they can employ their men in the general trade?—I believe that many of the manufacturers are general manufacturers of arms for the Continent, and the markets of the world, and they employ their workmen afterwards to a certain extent in that way.

5067. That ought to enable them to produce their work cheaper, ought it not?—I do not know that.

5068. Suppose you could give your men regular employment, if you did so would not you be able to produce cheaper than if you had to supply an uncertain demand?—When you are accustomed to an arm, and have been at work at it for a long time, you can reduce the price, because the men have been accustomed to it, and the more regular the supply is, certainly the more capable you are of reducing the price.

5069. Supposing that they were not all the same arms, and supposing that you could regularly employ your men upon different sorts of arms, could you not produce them all cheaper, than if you had an uncertain demand of each kind?—By employing your men on regular work, you could certainly produce, at a slightly less cost, arms of any pattern.

5070. And that the trade have an opportunity of doing, because they have several customers where you have only one?—That question can be answered by the facts of the case, as to what they do do.

5071. Supposing that there are two employers, and one has the means of regularly employing his workmen, as the private trade have, and the other cannot regularly employ a large number of workmen, as the Government cannot, because their demand is uncertain, would not the employer who can employ his workmen regularly produce more cheaply than the one who cannot employ their workmen regularly?—I should consider that he would be in a position to do so, but what he would do I do not know.

5072. Mr. *Monsell.*] When the Government demand ceases, has the private trade the means of employing their workmen?—I believe that they fall back to an inferior description of work.

5073. Colonel *Lindsay.*] You were asked as to the time that the English musket would last, and I understand you to say that you did not quite know; do you know whether or not it is 12 years?—That is the estimated time.

5074. Can you tell what time the Belgian musket lasts?—I am told that it lasts 30 years.

5075. Lord *Seymour.*] The new Belgian musket was only introduced in 1840?—But that is their calculation; they have no experience.

5076. Mr. *Walpole.*] Do you know, according to their calculation, what length of time their former muskets were supposed to last?—I do not know.

5077. You did not have the question of comparative durability raised before you?—No.

5078. Colonel *Lindsay.*] Have you any information as to the time that the French musket is calculated to last?—No.

5079. You do not know what the calculation made at Liege is as to the time that the muskets will last?—I was informed that they calculated that they would last 30 years.

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5080. You do not know anything about those muskets that are made in France?—No.

5081. Have you any information at all in the papers that you may have at Enfield as to the reasons why the manufactory at Lewisham was given up?—I am not acquainted with that circumstance.

5082. Do you know of any difficulty having been thrown in the way of the Birmingham workmen getting employment at Enfield?—I cannot say that I do.

5083. You do not know anything of a circular having been sent round describing a man?—I do not.

5084. Mr. *Muntz.*] Can you form any estimate of the proportionate durability of the English and Belgian muskets?—Merely from what I was informed as I came into the Committee-room, that 30 years was the estimated time that the Belgian musket would last.

5085. Supposing that the Belgian gun lasts 30 years, do you think that ours will last any longer?—No; I do not think so; I think that they are equally capable of bearing about the same service.

5086. Though one is not finished so highly, they are both durable?—Yes; our service may use their arms more roughly than in the Belgian service.

5087. You do not know the reason why the Lewisham manufactory was given up?—No, that was before my time; I have never entered very minutely into that question.

Mr. *Richard Aston*, called in; and Examined.

Mr. *R. Aston.*

5088. Mr. *Muntz.*] YOU are a Gun Furniture Manufacturer, are you not?—I am a General Gun Furniture Maker.

5089. Where do you live?—At Birmingham.

5090. Do you live in the town?—Yes.

5091. You are a contractor also, are you not, for some articles for the Board of Ordnance?—I am, in connexion with my brother.

5092. Did you contract for a part of the materials for the order of 1851?—We contracted for 23,000 sights.

5093. At what time did you receive your order?—It was in June 1851.

5094. When did you commence your deliveries?—The latter end of July, or the beginning of August.

5095. Did you supply your quantities according to the contract?- We did not.

5096. For what reason?—Through the difficulties of inspection.

5097. What were the difficulties?—The first was the alterations suggested by the viewer in the spring slide and leaf; that they should be made differently to the original pattern.

5098. Lord *Seymour.*] Was the pattern altered?—No, but he suggested that the supply should be altered; he suggested those alterations as improvements.

5099. Mr. *Muntz.*] Had you no communication with anybody on the subject of these alterations?—No, we did not consider it worth while at the start. He also required the joint to be finished in a particular direction. In a few weeks we got over these difficulties by having some small hand-machines made for the purpose.

5100. How long did that hinder you?—Nearly a month, I should think.

5101. After you got over that, did you meet with any other difficulties?—Yes. After we succeeded in doing those as he first required them, he refused to have them, because he received some of them at first that were different.

5102. After you had made the alterations that he required he refused to take them with those alterations, because he had taken some according to the pattern?—Yes.

5103. What did you do then?—I came to London and waited upon Mr. Lovell with a sample of the rejection, and he said, that if parties took things at a low price and got themselves into trouble he could not help them.

5104. Was the price lower than it had been before?—No, there had not been any made before.

5105. What was the result of this interview?—I said that the question between him and ourselves was not a question of price; the question was whether those sights could with propriety be received.

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5106. Were those the sights that were altered by the viewer, or were they those that were made according to the pattern?—I cannot say that exactly, but they were rejected ones. Mr. Lovell promised to have them viewed in London, and to let me know the result, but he never wrote. In a fortnight he came to Birmingham, and I waited upon him requesting him to look at a lot of 75, that I had down for inspection, and he expressed his surprise at the progress we had made. Mr. Evans, the head viewer, was present at the time, and I particularly drew their attention to the parts that had been most complained of; and Mr. Evans said, that such as those would not be rejected, and the 75 were then handed over to the viewer.

5107. Were they received at last?—Only three.

5108. What was the reason of that?—I went down to the view rooms the next morning, thinking to see Mr. Lovell, but he had left. I looked at the rejections, and I wiped the chalks off several of them, and I showed them to the head viewer, and he said that they were not rejected for what I said, and I asked him for what they had been rejected, and he said he did not know. Upon a further examination of the lot, he said that he would go through them again himself with the viewer.

5109. Did he do so?—They were left till the following day, and when I went down he said, that there were other faults in them, but he did not explain what, and that they could not be received. My opinion is, that they had not been re-examined at all.

5110. Did you see Mr. Lovell again upon it?—I did not.

5111. What did you do?—We proceeded with the order much better for about two months, making them according to the original pattern.

5112. Did you make such progress as to get anything like your supply delivered?—Yes, without much cause of complaint; then the viewer was taken off our sights to view other work.

5113. Was that the cause of the delay?—Yes.

5114. How long did that hinder you?—I cannot specify exactly.

5115. Could not another viewer have been appointed to do it?—Just as well; the delay was caused by the number of rejections that were made.

5116. You stated that you went on better for about two months?—We went on worse after the viewer was taken off; three others were put on to view what this one man had been viewing.

5117. Then you went on worse?—Yes.

5118. What was the reason of that?—I cannot tell, but it more than trebled our rejections. I suppose they held different opinions to the viewer before.

5119. Had they any written instructions?—I think not.

5120. Did you complain about that?—Yes; I complained again to Mr. Lovell that the view was as bad as it was at first, and that one of the viewers out of the three viewing by jig did so knowing it to be aside, which caused us to have many sights back that were actually straight.

5121. Were the rejections by those three viewers at all alike, or were they to the same extent in each case?—No; there was so much difference that I could almost separate the views when they came back in quantities.

5122. Did you make any more complaints about it?—Yes; and Mr. Lovell removed the man that rejected the most.

5123. What did you do with the sights that you had by you?—We had between 3,000 and 4,000 that had been rejected.

5124. Were they all made waste?—They were not; we had very few left on hand when we completed the order.

5125. What was the reason of that?—There were nearly 2,000 received without any alterations at all as to what they had been rejected for.

5126. Without anything being done to them?—Yes.

5127. Did you send them down again without any alteration?—Yes, and nearly 2,000 were received out of the number that I stated before, between 3,000 and 4,000.

5128. How much time did you lose by it?—It would be impossible to tell exactly. I should say, that upon the whole, the order did take us nearly double the time.

5129. Did you ever hear what was the cause of the irregularity?—Never.

5130. Have you ever had any viewed at Enfield?—Yes.

5131. How

5131. How was the view there?—Very much better; in fact I never had occasion to complain of the Enfield view in my life; although we have sent a great quantity of work down there.

5132. Were the men that were put on to view the sights new men, or had they been used to it before?—They were not used to it. The man that was first put on had been used to viewing, percussioning, and the others were used to various jobs, screwing together and stocking.

5133. Did you hear that any of the other contractors had the same difficulties that you had?—Yes, more particularly the lock-makers.

5134. What have you in your hand?—I have here the statement of one of the lock-makers, who handed this over to me the other day.

5135. What proportion of his was rejected?—Seventy-five per cent. nearly.

5136. What was his name?—Sansom.

5137. Is he a Birmingham man?—No, he is a Wednesbury man.

5138. How does he account for that?—In the first part of his order, the first two or three views, there was not more than 10 per cent. rejected.

5139. What was the cause of the increase?—I do not know the cause.

5140. Mr. *Newdegate.*] What was the date of that?—When the views got worse it was about August the 12th, 1851.

5141. Mr. *Muntz.*] Was that in the first order?—Yes.

5142. You consider that the view is a very unpleasant view, and interferes with the progress of the work?—I think it very unpleasant indeed.

5143. Had you any quarrel with these men?—Not that I am aware of.

5144. You had no dispute with them?—No.

5145. You had an order to make some artillery carbines, had you not?—Yes; we had bands and sights to make for the artillery carbines.

5146. Have you completed them?—Yes.

5147. Was there any delay in them?—Yes.

5148. What was the cause of the delay in them?—More particularly being new patterns; but the view of the bands in regard to them was a very extreme view, and the sights too.

5149. Did one man view them?—Yes, one man principally viewed the sights, and one man the bands.

5150. Have you also contracted for some materials for the last order for the rifle musket, the order of the 6th of October?—Yes.

5151. Have you got a contract now for those materials?—Yes.

5152. Have you sent in any?—We have sent in up to this time about 300 bayonets, 2,350 rammers, 1,100 locks, 6,000 sets of small materials, and 8,000 sets of bands.

5153. Are you much behind hand in the supply of those articles?—We are behind, more particularly with the bayonets, and some few of the rammers.

5154. Do you use any machines in making your bayonets?—We employ machinery, so far as we consider it wise, in all our work.

5155. When you find that it is more expensive than hand labour, you employ hand labour?—Just so.

5156. What is the reason that you are behind hand with your bayonets?—The first reason was, that we were seven weeks before we got the pattern.

5157. What was the reason of that?—There was only one for the whole of the six contractors; I am not aware that more than one had the pattern; I think it was Mr. Lawrence that had it nearly seven weeks.

5158. Did you apply to him for the pattern?—I did, at the view rooms.

5159. What answer did you receive?—That they had not got it.

5160. Did they say who had?—Yes, Mr. Lawrence.

5161. Mr. *Newdegate.*] You do not know that he had it for seven weeks, do you?—I know what I was told at the view rooms.

5162. Mr. *Muntz.*] Did you ever apply for a duplicate?—Many times; and Mr. Lovell said that I should be the first to find fault with it.

5163. Why did he say that?—Because he said that they could not make six or seven near enough to view to.

5164. How do you account for the present high price of bayonets?—First, it is a new pattern, and very highly finished; and the next thing is, the uncertainty of any further orders following.

5165. Do you know that notice was given that there would be further orders when the previous orders were completed?—Nothing decisive, that I remember.

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5166. Was there anything said about it?—I think there was something said about it, but there have been so many alterations in the pattern.

5167. But there was nothing that you could depend upon?—No.

5168. Supposing that you had consecutive orders which you could depend upon, would that make much difference in the progress of your work?—A considerable difference.

5169. Would it make any difference in the price?—No doubt of it.

5170. Can you form any idea of what difference it would make in the price of the present bayonet?—I should think 20 per cent.

5171. Upon 7*s.* 6*d.*?—Yes.

5172. Would it be more than that?—I think about that; it perhaps might be more, if coupled with a view measured by utility instead of the view that we have had.

5173. You think that the view was too particular for a useful view?—It has been; I do not complain of it now.

5174. Is there any material or important difference now?—Very considerable.

5175. You find that they now only reject those that may properly be found fault with?—Yes.

5176. And before that time they rejected them without any evident cause?—Frequently.

5177. Supposing any dispute arises between the viewers and you, how it is settled?—I should go to Mr. Gunner.

5178. Have you had any dispute since Mr. Gunner's time?—I have not.

5179. How did you act before Mr. Gunner's time?—I went to Mr. Lovell.

5180. Did he pay any attention to your complaint?—Sometimes he did.

5181. Would it be of any use to you, do you think, to have an umpire to decide disputes between you?—Of very great use, I should consider.

5182. You have no appeal now, have you?—No, though I have every confidence in Mr. Gunner.

5183. You think that Mr. Gunner would do his duty by both parties?—I do.

5184. Do you know any plan that would be useful to settle those disputes between the Ordnance and yourself?—I think it would be much safer to have a third party.

5185. You have never had that yet?—No.

5186. Did you ever hear that they had in the case of the barrel makers?—I do not remember it.

5187. Having full confidence in Mr. Gunner, you recommend that in case of any future disputes between you, a third party should be appointed to decide between you?—Yes.

5188. You are progressing well with your order, are you not?—Yes.

5189. Not having more than a fair quantity rejected according to the nature of the work?—I have no complaint at all to make.

5190. Has that been so since the appointment of Mr. Gunner?—Yes.

5191. Colonel *Dunne.*] Had you an order for side nails and bayonet springs in November 1852; for 5,000 side nails, and 10,900 bayonet springs?—I do not remember that.

5192. You will not deny that you had it?—No.

5193. You did not deliver them in time, did you?—I could not swear to that now

5194. On the day of delivery you had not delivered one of the side nails, and you only delivered 4,470 bayonet springs, and of all those the whole of the rejections were 363; can you state that the rejections were the cause of your not fulfilling your contract in that instance?—No.

5195. Did you deliver them by the 31st January, or by the 28th of February?—I cannot say now.

5196. Did you contract on the 8th of January 1853 for the same articles?—I think it is very likely.

5197. Did you fulfil that contract, or did you not deliver them till July last?—I am not aware that we had any complaint, or anything of that sort.

5198. Had you another contract on the 27th of June, which you also failed to fulfil?—I do not recollect the dates.

5199. Did

5199. Did you deliver any single one of the articles till February 1853?—I do not remember anything of the sort.

5200. On the 16th of May 1853, you had a contract from the Ordnance for different fittings, springs, and things of that kind; did you deliver them in time?—I cannot recollect.

5201. Then on the 16th of May, to be delivered on the 9th of July, and the 27th of June, had you a similar order from the Ordnance?—I do not remember it.

5202. You are not aware whether you delivered the articles in time?—No.

5203. You had an order, had you not, on the 11th of May 1853, for rammers and swivels, to be delivered on the 13th of July and the 9th of September, for the constabulary?—I do not remember.

5204. Do you recollect a contract at that time in which you completely failed?—No.

5205. Do you remember on the 16th of May 1853, having another contract of the same kind to be delivered on the 16th of June and the 27th of June?—No.

5206. Which you only completed on the 3d of October 1853?—No.

5207. Do you remember on the 16th of May, receiving an order for 100 pistol fittings, to be delivered on the 13th and 16th of June?—Yes, I do remember that.

5208. Do you recollect that you did not complete that order till the 3d of October?—I do not remember when they were completed; one thing I recollect, and that is, that I had no complaint made.

5209. Do you recollect that, on the 27th of June 1853, you had a contract for the fittings of 30 pistols, carbine bore, which you were to have completed on the 12th of July and the 25th of August?—I do not remember.

5210. You did not complete your contract till September 1853?—I do not remember the dates; I recollect having orders for 30 sets of pistol materials, but I do not think they were much over their time; I had no complaint about them.

5211. Do you remember on the 29th of July, the 3d of August, the 10th of August, and the 6th of October 1853, getting an order for fittings and sights for 100 double carbines for the police in Ireland?—Yes, I do.

5212. Did you not fail in that contract?—I think we were rather over time.

5213. Do you remember making any excuses for you failure?—I calculate that if we were written to we should.

5214. On the 22d of August 1853, did you write to the Board an excuse for the non-completion of the order for rammers, bands, sights, and fittings for 1,050 rifled muskets ordered in March 1853, ascribing it to the general strike at the time and your want of fresh hands?—I am not aware of that.

5215. Do you recollect that you have been frequently fined by the Ordnance for non-delivery?—Yes, twice.

5216. Did you not make excuses on various occasions to the Ordnance for an extension of time?—Yes.

5217. In anyone of these letters of excuse did you complain of the view being too strict, or of not having received the patterns?—I do not remember that I did.

5218. Not to the Board of Ordnance?—No.

5219. Do not you think that if you had complained that Mr. Lovell treated you ill you would have obtained redress from the Board?—Perhaps I might.

5220. There is a letter of the 18th of January 1853, in which you state that you are prevented from having completed the order for the back sights and other fittings by the general strike; do you recollect that?—I do not remember the words. (*A Letter was handed to the Witness.*)

5221. Mr. *Monsell.*] Did you ever address any communication to the Board of Ordnance on that subject?—This is our letter.

5222. Will you be so good as to read that letter?—" In reply to your note of the 14th, we beg to say we are sorry to have caused you to remind us of the non-completion of the order for back sights; but after having completed the former order, our men made a general strike, they having an idea that we had but a limited period to execute the order, and other branches of the trade being busy, and many of them procured other situations, and we have had fresh hands to learn;

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learn; but are now doing about the number required, and have no doubt shall be able to proceed without any further inconvenience to the service. Trusting the Honourable Board will consider the above explanation satisfactory (without having recourse to fines), as their assistance in these matters will be the only means of preventing such occurrences."

5223. Lord *Seymour.*] In that letter you refer only to the general strike as the reason for the delay?—Yes.

5224. Now you bring forward another reason for the delay; why did you not then state the reason that you now state?—I stated the reason then on this one particular order.

5225. Had the pattern nothing to do with that order?—No; this was the start of that order; the commencement of it.

5226. Then in January 1853 you had not been obstructed in any degree by the want of the pattern, or by the view?—I am not aware of that.

5227. Therefore your only hinderance then was the strike of your men?—Yes; but the view was very stringent after the men started to work.

5228. Up to the 18th of January you had no reason to offer except the strike of your men?—Yes, just so.

5229. Mr. *Monsell.*] Will you state to the Committee to what order that letter of yours referred?—I think it was the order for 6,000 sights of the Minié pattern.

5230. Was it the order that you received in 1851?—No.

5231. You are distinct upon that subject, that the letter was not addressed to the Board with reference to that order?—Yes, I am distinct upon that subject.

5232. Lord *Seymour.*] Do you know to what order it did apply?—To an order that we received after, I believe; I cannot recollect all of them; not since 1851.

5233. Mr. *Newdegate.*] You appear to have had some difficulty in answering the questions that have been put to you, is that because you have not your accounts before you?—It is.

5234. You cannot trust to your memory to follow the dates which have been suggested in the questions?—Not exactly, I cannot.

5235. Will you state whether some fear of offending Mr. Lovell has not impeded your representing to the Board the difficulties thrown in the way of your completion of your contracts by the view?—We were always very cautious on that account.

5236. Had you reason to be cautious lest you should offend Mr. Lovell by representing to the Board the manner in which the view was conducted, and was it that which impeded you?—Just so.

5237. That may account for your having, on several occasions, rested your justification of delay upon other reasons, which were part of the causes, but not the principal cause of the delay?—Yes.

5238. At the same time you are not prepared to retract any part of your evidence as to the delay caused in the construction of the sights by the viewers not having adhered to the pattern?—Certainly not.

5239. You have stated that that caused you to be twice the time that you would have been in completing that order?—There is no doubt of it.

5240. Mr. *Muntz.*] Did you ever try any machinery in any work that you make?—We did in starting those sights.

5241. Did you not find it succeed?—We could not get on with the order.

5242. Mr. *Monsell.*] You have made frequent communications to the Board of Ordnance; did you ever, in any one of these communications, distinctly state or hint at the causes for delay which you have mentioned to the Committee to-day?—Most certainly I have.

5243. Will you be so good as to produce those communications?—I stated in the communication, on the 22d of August 1853, that we had many litigious points to contend with; points that were never calculated upon even by those who made the patterns.

5244. Will you have the goodness to read the whole of that letter?—What I have here is not an exact copy; but I dare say Mr. Wood can refer to it, it is dated the 22d of August 1853.

5245. Colonel *Dunne.*] The excuse given to the Board of Ordnance for the non-completion of the order for rammers, bands, and sights for 1,050 rifled muskets, is ascribed to the high price of workmen, and to the removal to other premises;

premises; is there anything of that in the letter which you hold in your hand?—No, there is not any delay attributed to the high price of workmen.

5246. You wrote a letter to that effect on the 22d of August 1853, did you not?—Not that I remember; I waited upon Colonel Maule with this note, on the 22d of August; myself, and Mr. Wood was present, I think.

5247. Mr. *Monsell.*] What did you state to Colonel Maule?—What I have just stated.

5248. What reply did he make to you?—I asked him to allow them to be sent to Enfield to be examined, and either used or returned, stating the faults that they had been rejected for; I had the articles with me at the time, and he said that it would be unfair to send them to Enfield, because that would be putting Mr. Gunner before Mr. Lovell, or something to that effect.

5249. Lord *Seymour.*] You received an order also in October 1853?—Yes.

5250. And with regard to that order on the 19th of January 1854, you wrote a letter to the Ordnance, stating the reasons why you had failed to furnish that supply?—Yes.

5251. In that letter you stated, that the principal cause of the delay was the Christmas holidays?—That was the reason given.

5252. Do you think that a reason to give, having the notice in October, to a public department for not having completed your supply?—We only had the order in October and the pattern in December.

5253. Then the cause of the delay was, that the pattern was not supplied to you till December?—Yes.

5254. You did not state that in your letter, but that the cause of delay was the Christmas holidays?—Yes; and our only receiving the patterns just before the holidays caused the delay.

5255. The real cause of delay was the pattern not being sent till December?—Yes; that was the first reason of the delay.

5256. When did you get the pattern?—I believe I had the pattern bayonet on the 14th of December.

5257. You took the contract in October, and agreed to furnish a certain quantity by a certain time?—Yes.

5258. Do you mean that you entered into that contract from the time when you received the order, or from the time when you obtained the pattern?—I could not commence till I had the pattern.

5259. Was your contract within a certain number of weeks from the time that you received the pattern, or did you enter into a contract to deliver the quantity within a certain time from receiving the order?—Within a certain time from receiving the order, but I supposed that I should have had the pattern at once.

5260. Had you in every former contract from the Board of Ordnance received the pattern at the same time with the order?—Not in all cases.

5261. Then you were aware that there was often a difficulty in obtaining the pattern from the Board of Ordnance?—Yes.

5262. Would it not have been more judicious to have provided that your contract should commence from the date of receiving the pattern rather than from the date of receiving the order?—It would, no doubt.

5263. Mr. *Walpole.*] Did you ever apply for the pattern?—Many times.

5264. To the Board of Ordnance?—No.

5265. Colonel *Dunne.*] Do you recollect that you wrote on the 17th of December 1853, to the Board, an excuse for not having completed the contract for bayonets, in which you did calculate the time from the time of receiving the pattern, and yet you gave as an excuse, "our time having now expired since we were furnished with a pattern, that we should have commenced our supplies," and you go on to make excuses for not having completed the contract; can you attribute your failure in that instance to your not having received the pattern?—I believe, I said, it was December, but I should have said November.

5266. Mr. *Newdegate.*] Will you just look at that printed paper (*handing the same to the Witness*), and state whether you received the pattern on the 14th of October, or when you received it?—This is dated the 17th of December.

5267. Did you not receive the pattern till after the 14th of October?—The 14th of November.

5268. Did you receive the pattern on the 14th of October?—No.

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5269. How long after the 14th of October was it that you received the pattern?—A month, I think, from the date of order.

5270. Colonel *Dunne.*] In that letter you have given as an excuse that it took you longer to commence, but you do not give as an excuse your not having received the pattern?—I think I do. I say, "since we were furnished with a pattern."

5271. Further down you say, "that not having made any of them in the previous order, it has taken us rather longer to commence than we anticipated," and you make no complaint of not having received the pattern till a month later; will you positively say that you did not receive the pattern till a month after the 14th of November?—Certainly not; I only speak from memory.

5272. Will you turn to the last page, to the letter of the 9th February 1854, in which you state that you have forwarded three new pattern rifled musket bayonets; you make a complaint about the grinding, but finally you attribute the rejection or the condemnation of those bayonets to their being badly ground, which you admit and attribute to the workmen; in that letter, can you complain of the strictness of the view, or do you do so?—I do not. I admit the inferiority of the grinding to the pattern.

5273. Therefore the view was not in that case any impediment to your fulfilment of the contract?—I have not stated so.

5274. There are ten instances in which you have not fulfilled your contracts; can you state that in any of them there has been any number rejected, to justify the statement that you have made, as to the strictness of the view?—Certainly.

5275. Where do those rejections appear?—I have a statement here of the first order. We were speaking of the Minié sights in 1851; we commenced in August; we sent down 655, and we had 156 received, and 499 rejected.

5276. Lord *Seymour.*] When was that?—In August 1851.

5277. Mr. *Geach.*] That was the order of August 1851?—They were sent down in August 1851. In September there were 1,372 invoices, 710 received, and 662 rejected. In October, 1,848 were invoiced, 959 received, and 526 rejected. In November, 2,134 were invoiced, 1,677 received, and 457 rejected. This is the time that I spoke of when we had got better with the view.

5278. Colonel *Dunne.*] In many of those instances, were you not fined by the Board for non-performance of your contract?—Twice, I think.

5279. Did you make any complaint at that time against the viewer?—That was the latter end of this order; that was after this time.

5280. What is the date of the order?—1851.

5281. You were fined about the 18th of January 1853, were you not?—I think we were.

5282. Did you make any complaint of the strictness of the view then; did you not attribute it to the strike of the hands?—In that particular case I believe it was the strike of the hands.

5283. Mr. *Monsell.*] In the paper which you hold in your hand, have you any statement about the view in January 1853?—No.

5284. When did you complete the contract for 23,000 sights which you entered into in 1851?—In October 1852.

5285. Had you delivered the whole in October 1852?—Yes, I believe so.

5286. The whole of the 23,000 in October 1852?—Yes.

5287. Mr. *Newdegate.*] Those were the sights that were put on crooked, were they not?—Yes.

5288. How was that done?—That was a part of the trade that I had nothing to do with myself.

5289. That caused a delay in the completion of the arm, did it not?—Yes.

5290. Mr. *Muntz.*] It appears from what has been stated, that those difficulties that you had then were in regard to such small orders, that they were hardly begun before they were finished?—Just so; and we had no complaint about them at all.

5291. They were very small quantities?—Yes.

5292. Lord *Seymour.*] What was the amount of the order in October 1853?—I have not the order with me; we had something over 3,000 bayonets, between 6,000 and 7,000 rammers, a little over 3,000 locks, 10,000 sets of small work, and we had 20,000 sets of bands.

5293. Do you include sights in the small work?—No, we had not an order for the sights; I believe that the order for the sights has been recently given out.

5294. You

5294. You did not make any of the new sights?—No; we had no order for them.

5295. Mr. *Monsell.*] At what price were you delivering the sights that you delivered in January 1853?—At 4*s.* 6*d.*, I think.

5296. At what price did you deliver the sights for the 23,000 contracted for in 1851?—Four shillings.

5297. Then for what purpose were the sights to be used that you were delivering in January 1853?—For a similar purpose.

5298. For what arm; for the Minié rifle?—I think they were guns that were in stock that were sighted.

5299. Were they Minié sights?—Yes, of the same pattern.

5300. Were there any sights put upon guns that were in store?—I understood so.

5301. Were they Minié sights?—Yes.

5302. Have you got any return that would show the different periods at which you delivered the 23,000 that you contracted for in 1851?—I have, up to the alteration in the pattern.

5303. How many were delivered; for instance, in October 1852?—I have September 1852.

5304. How many were delivered in that month?—There were 21,331 received.

5305. Do you know how many you delivered in October?—I believe more than sufficient to cover that order. I have not got the return for that month.

5306. You complained of some vexatious viewing at the beginning of the order that you received in 1851, and you spoke particularly of one viewer who treated you badly in the first instance; can you mention his name?—I cannot think of it just now; but it is the same viewer who has been viewing sights for us lately.

5307. You complained also of one or two out of three viewers afterwards, who viewed your sights; do you recollect the names of those viewers?—Yes, Chambers was the one that was taken off.

5308. Was that on account of his vexatious viewing?—Yes; at least he was taken off after I complained, and I supposed that to be the cause.

5309. Did you complain of that vexatious viewing to the Board of Ordnance?—I complained to Mr. Lovell; not to the Board.

5310. Did you contract for 6,000 back sights for muskets, for the Guernsey and Jersey Militia, in October 1852?—I think that those must have been the sights that we were speaking of before; I did contract for them.

5311. Do you remember that you were to have delivered them on the 31st of December 1852?—No.

5312. You do not know that at that time only 672 had been supplied?—I do not remember that we were that far behind. I think not.

5313. Have you the letter in which you assign to the Board of Ordnance a cause for the delay?—No.

5314. Can you produce it?—I have not got it here; it is at Birmingham.

5315. Mr. *Muntz.*] You have made several attempts, have you not, to manufacture some materials, by using a larger quantity of machinery than before?—Yes, we have.

5316. You did not succeed in it?—No.

5317. Did you finish any articles with that machinery?—We did not finish them right off.

5318. Did you finish any articles with machinery, and afterwards send them to the viewer?—Yes, we did.

5319. What was the result?—We could not get on with them.

5320. What was the reason?—I know that no reason was assigned to me; I have heard it reported by the men in the shop, that the viewer should say, "he would machine them."

5321. Your men?—Men in the shop, but I cannot speak to it positively.

5322. Colonel *Boldero.*] How many viewers are there at Birmingham?—I do not know.

5323. How many do you suppose?—I have not taken an interest in counting them up.

5324. Are they employed separately in viewing different parts, or does each viewer

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viewer view the whole component parts of a musket?—They are employed separately in viewing the different parts.

5325. Are there more than two men to view any particular part?—In some branches I should say there were more than two.

5326. When the view is finished, are the articles all placed in a lump together, so that you cannot tell which man viewed them?—Each man could tell his own viewing if only by his own mark.

5327. Could the inspector tell which man had rejected an article?—Exactly; every man is numbered.

5328. The inspector knows who the person is that has rejected an article?—Yes.

5329. If a man did not act fairly, the inspector could see who had made the rejection, and if he repeated it, and other individuals passed work of the same kind, he would be dismissed the service, would he not?—No, I never knew of a case.

5330. Did you not state that one individual was dismissed because he had unfairly rejected something?—No; I said that he was taken off viewing the sights.

5331. Why was he taken off viewing the sights?—I supposed that it was from my complaint.

5332. Was it for being incompetent, or for an unfair view?—I do not know; I do not know anything that transpired between Mr. Lovell and the viewer.

5333. If you do not complete your contract in a given time, you put the Board of Ordnance to very great inconvenience: if the other component parts of the musket are ready, and they are wanted for an immediate purpose, they cannot be issued out because you are behind your time?—I do not think that there has been a case in which they have waited for our materials.

Mr. *John Field Swinburne*, called in; and Examined.

Mr. *J. F. Swinburne.*

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5334. Mr. *Muntz.*] YOU are a Contractor with the Government for setting up guns, are you not?—I am.

5335. You receive the materials from the Government to set them up into guns?—We do.

5336. How many contractors were there who took part in the contract upon which you are engaged?—Messrs. Hollis & Sheath, Tipping & Lawdon, Thomas Turner, and ourselves.

5337. You contracted on February 1852, for 23,000 Minié rifles, did you not?—Yes, we did.

5338. When did you complete the order?—I do not think that it is completed now.

5339. How is that?—We had not the last materials till last week, not one of the contractors; my individual contract was completed, and has been since the month of July or August, I think.

5340. What were the terms of your contract?—Perhaps it would be more convenient that I should speak of it jointly.

5341. What were the terms of the contract?—The contract was to be completed by the 24th of March 1853.

5342. When did you receive the first issue of materials?—On the 17th of March 1852.

5343. When did you begin making any deliveries?—In the following July, the first finished guns were delivered.

5344. According to the contract, they were to have been delivered in May, were they not?—Not exactly; according to the specification, we were entitled to eight weeks: the muskets, I should say, were to be delivered at the rate of 600 per week, after eight weeks; but we did not receive the eight weeks supply, that is 4,800 sets of materials, till the end of May.

5345. Mr. *Walpole.*] What was the date of the contract?—I think it was the 4th of February; I am not positive of that.

5346. Mr. *Muntz.*] According to that, you ought to have delivered the guns in two months?—Yes.

5347. That would have been the 4th of April?—Yes.

5348. You

5348. You did not commence delivering till when?—Not till the end of July.

5349. What was the reason of that?—There were several reasons. In the first place, the pattern of the gun was not decided upon.

5350. When was it decided upon?—Not till the 16th of July.

5351. That being so, how could you go on with the work?—We could not. We had no orders till the 16th of July to proceed to finishing those rifles; we had no means of proceeding further than the second stage of setting up, the screwing together stage, till after the 16th of July.

5352. Did you receive the materials in a perfect state ready to set up?—We ought to have received the materials in a perfect state; but in this instance we did not.

5353. What was the matter with them?—In consequence of the alteration of the pattern, the alteration of the elevation of the back sight; the back sights were ordered to be returned into store on the 26th of May, and those sights were not finally received out till last June. The delay was occasioned in the commencement by the alteration in the sight, and the mode of putting it on the barrel, and the question of the rifling, which was a question that the small arms committee, I understood at the time, had not decided, and the result was that the Board could not give the order for finishing till the 16th of July.

5354. Was there no alternation of the pattern besides?—No; no material alteration. There was an alteration in the elevation of the sight, and an alteration in the mode of putting it on, which was an improved mode that we proposed, and our muskets were sent to Woolwich for trial, and adopted by the small arms committee. I believe they were sent on the 29th of April.

5355. At what date were they returned?—Not till very recently; I cannot give the date.

5356. Is it a common practice with the Board to alter their patterns?—Not common; but I think in all the Minié rifles the Board have not given one order without an alteration in the pattern.

5357. You really had no *bonâ fide* order to finish the work till the 16th of July?—No; the 16th of July 1852.

5358. Though the contract was taken in February?—Precisely so.

5359. That was a loss of six months' time, was it not?—It would be a loss of some months.

5360. Did you make any application to the Board for an extension of time in consequence?—We did at the commencement, but we never acted upon it. It was made under extraordinary circumstances. At the time we did it we also expressed our willingness to proceed at once if the Board desired it.

5361. What reply did you receive?—We had the extension of time that we asked for.

5362. What was that?—One month, to the 30th of April; that is to say, the time was extended from the 24th of March till the 30th of April.

5363. Was it not the former practice of the Board to give a pattern to each maker?—I never knew it so; our firm never had a pattern previously to commencing a contract; the inspector always refused to give them.

5364. Was there only one pattern between all the contractors?—We had none at all.

5365. Not on the 16th of July?—Not at any time; no pattern whatever.

5366. What did you work to?—There was a pattern in the Tower in London before we tendered, and there was also a pattern gun in the view rooms at Birmingham.

5367. You did not have that in your possession?—No.

5368. Did you take your dimensions from the pattern in the view rooms?—Yes.

5369. Each of you?—Yes.

5370. Had you no other pattern to work by?—No other pattern.

5371. You state that the pattern was not settled till the 16th of July; did you fulfil the contract according to its terms from that date?—We did fulfil our contract in the delivery up to the 28th of February, I think; but I consider that on and from the 16th of July we had six weeks according to the specification; it took five weeks to pass the guns through the view rooms in the different stages. The first delivery would be due the first week in September, and we had actually

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delivered at the same time, I believe, nearly 1,000 guns, and by the end of September we had delivered 2,633.

5372. Mr. *Newdegate.*] How many were due?—Six hundred up to the first week in September.

5373. Mr. *Walpole.*] Had you delivered more than was due?—Yes.

5374. Mr. *Muntz.*] What was the reason that you did not complete your contract before the 24th of March?—The reason was, the wholesale rejections on account of the defect in the sighting, and the delay that took place in the issuing of the materials; there was a delay of some weeks that took place in that, in the latter end of the order.

5375. Mr. *Newdegate.*] What do you mean by rejections on account of the defective sighting?—That was what has been called the guns being crooked-sighted, the lumps having been machined wrong in the Ordnance view rooms, or I should say the guns were worked to two bases, the breach pin had been turned, and the square had been made different to the square of the centre, so that the gun was stocked to a different square to that of the centre, and the sights were put on to the centre.

5376. Was that the fault of the directions given by the inspector of small arms, or the Ordnance authorities, or was it the fault of the contractors?—The fault of the Ordnance authorities, undoubtedly.

5377. It was the fault of the Ordnance that created that delay?—Decidedly so.

5378. Mr. *Muntz.*] Did you make any representation to the Ordnance upon that subject?—We did; and we received a letter from the Ordnance, I think, dated the 2d of March, requesting to know when the rifles would be completed; and in reply to that we stated, on the 5th, that we could not state the time or fix any definite period, in consequence of the wholesale rejections on account of the sights.

5379. Was that your excuse for not having completed your contract?—We did not make that our excuse for not having completed the contract; we say that we have done so, and more than that, because the cause of the contract not being completed was the discovery of the sights.

5380. Was any blame attached to you at all as to those sights?—We certainly consider not; there can be no blame to us; we acted under the instructions, in the first instance. When we first took the contract we saw the inspector of small arms, and he laid down a definite, fixed plan, by which those guns were to be sighted, and that plan we consider to be a correct plan; in fact, the only one by which they could be sighted; we did not know that there was an error in the squaring of the pins; we did not know that they had been turned.

5381. Did the inspector take the necessary steps to insure their being well sighted at all:—I should say not, or else the results would not have occurred that did occur.

5382. What is the reason that the order is not completed now?—The delay in consequence of the difficulties that occurred from the error in the sighting, and other causes; a few of the materials got lost, and the regulation of the service does not allow the contractor to supply any articles that might be made waste or lost. The contractors who have not now completed their portion of the contract, Messrs. Tipping & Lawdon, had a good deal of material waste, and they also had lost some, and that deficiency they applied for to the authorities in Birmingham, and their supply was not made till last week; that is the cause of the order not being completed.

5383. What quantity is still incomplete?—Some 16 or 18, not more.

5384. If you had machined barrels in the same way, would the inspector have taken them from you in that condition?—Certainly not.

5385. You did find fault with the machinery?—We returned a large quantity into store for alteration.

5386. What was said upon the subject?—They were ordered to be altered by the inspector and head viewer; I understood they were so after we received them out and we proceeded with the setting-up.

5387. What is the largest number of those rifles that you ever delivered monthly to the Board?—The largest quantity, I believe, was 3,139.

5388. Do you think that if you employed machinery, you could have done the work so well and more rapidly than it was done?—If we had had the whole of the

the setting-up of those guns in our own hands, we should have done it considerably quicker and considerably better, because if we had not done it better the Ordnance viewers would have rejected them. Every viewer knew of the error, and the inspector knew it, and he ordered them to be altered, and to take such measures as they thought necessary for that alteration. In fact a portion of the barrels were given out to a contractor for alteration; those barrels were altered and they passed through the usual accounts, and that was one reason why we thought that the Board might have considered us impertinent had we then represented the error in sighting in the first instance, when it was discovered; we certainly did not know of the extent of the error; we had no means of knowing it.

5389. Mr. *Newdegate.*] You were aware of the existence of the error, but you also state that the proper Government officers were aware of it?—Yes.

5390. And you therefore thought that it would be considered an impertinence on your part to have represented it?—Yes.

5391. It was an error of the Government officers?—Yes; it emanated from the machine-room of the Board.

5392. Mr. *Muntz.*] The barrels were frequently detained in the machine-room, were they not?—They have been recently a much longer time than it would have taken to have made the whole arm.

5393. Had you been waiting for materials during that time?—The barrels have been detained in the Ordnance machine-room in Birmingham for the present artillery carbines a longer time than it would have taken to have made the whole arm.

5394. What is the cause of that?—I do not know.

5395. At the time that you had the first contract for the 1851 Minié rifle, were any expectations held out to you of more being wanted?—We understood that more arms would be wanted; there was nothing understood at the time we took the contract; but in the latter end of the same year it was understood that an increase would be wanted.

5396. In consequence of some of the contracts not being completed, though yours is completed, what time did you lose by it?—It did not affect me at all in reference to any further supply from the Board of Ordnance.

5397. Had you any other orders in hand?—Yes.

5398. There was no time lost by you?—None; not in consequence of that.

5399. What orders have you in hand now?—We have contracts in hand now for those 2,000 artillery carbines, and also, I think, for 550 double carbines, and also for some pistols.

5400. Have you any of the Minié rifle of 1853 now in hand?—We have an order for them, but we have not yet received any materials.

5401. Are you going on with the orders which you have now in hand?—Yes; we are supplying them in less time than the stipulated time according to the specification, because we have so very little for our men to do; they are done up immediately we get them.

5402. If you had other materials in hand now, you could make a larger number of guns?—Four or five times the quantity that we are making.

5403. Lord *Seymour.*] What number of guns could you make a month in your establishment, if you had the materials furnished to you?—I should say, that at the present time we could make 1,000 guns a month.

5404. What do you suppose the four contractors could, together, supply per month, if they had sufficient materials furnished to them?—I should say, that they could supply 4,000 a month with ease. I may state, that in 1850 and 1851 three of the present four setting-up contractors supplied 30,000 guns in about six months, or under seven months.

5405. Colonel *Boldero.*] The quality was not so good as the present?—No, they were extra-service guns.

5406. Mr. *Muntz.*] Supposing the quality had been as good, what difference would that have made in the quantity you could have produced?—I am hardly prepared to say; it would have made a difference probably at that time in the number of a few thousands; I cannot tell the exact proportion.

5407. Are there not other gunmakers competent to make those guns besides the present contractors in Birmingham?—There are undoubtedly a few, but not to any very great extent.

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5408. Supposing there was a constant demand for guns of the present pattern, would it require any length of time to increase the make?—It would not require any great length of time. I may state probably what will at once illustrate the Honourable Member's question; that in the end of 1852, the Board of Ordnance wanted an additional supply of arms: the first opportunity that we had of increasing that supply, the first issue of additional materials, was in the month of November 1852, and the total quantity of guns delivered in the month of November 1852, was 2,919; and in the April following, which was a period of six months, the quantity had increased to something very considerable, namely, 4,458; that was in six months, from 2,919 in November, to 4,458 in April. Perhaps it is necessary to state that a portion of those were extra service, and sea-service guns; the exact quantity of rifles was 2,269, and the others were made up of the extra service and the sea service.

5409. In your opinion, in case of more work of this sort being wanted, would there be any difficulty in obtaining an increased supply of labour according to the work required to be done in Birmingham?—There would be no difficulty after the first few months; not in a moderately increased supply.

5410. Mr. *Monsell.*] What do you mean by a moderately increased supply?—I mean, that we could increase the supply from, I will say, 3,000 a month to 5,000 or 6,000 a month in a very few months.

5411. Mr. *Newdegate.*] Could you continue to increase it?—Yes, to any extent that the Board of Ordnance required.

5412. If you had the security of constant orders?—Yes.

5413. Mr. *Muntz.*] So that you could insure permanent work to your men? Precisely.

5414. Colonel *Boldero.*] What price do you get for setting up the Minié rifle of 1853?—23 *s.*

5415. Mr. *Newdegate.*] One great reason for your not having been able to supply the Ordnance regularly and rapidly, during the last three years, has been that the orders have come so irregularly and the patterns have been so much changed, that you have not been able to keep your men on in constant employment in consequence?—That has been the principal cause of it. As I stated before, in 1850 and 1851 we set up 30,000 muskets under seven months; and from that time till we received this 1852 rifle order, we had not a thing for our men to do from the Board of Ordnance. It was a period of 15 months from the last issue of the 30,000 order till the first issue of this rifle order; we then were only able to commence, and we only felt ourselves able to commence immediate delivery at the rate of 600 a week, because we had to recover our men. Many had left the trade entirely, but we had kept sufficient together to enable us to make an immediate delivery of 600 a week of superior arms.

5416. Was it your private trade that enabled you to keep the men together?—Yes.

5417. If you had had nothing but the Government orders, you would have been in still greater difficulty when you wanted to recover your men?—We should; if we had nothing but Government orders, we should have no men left.

5418. It was the fact of your having this private trade that enabled you to resume your work?—Entirely.

5419. You were connected, were you not, with one of the firms who signed a declaration, that if it was required, the trade at Birmingham could produce 50,000 rifle muskets in the first year, and 100,000 in the second?—Yes.

5420. You think that that declaration was deliberately made, and, so far as you are concerned, you are prepared to see it fulfilled?—Yes.

5421. And to fulfil it?—Yes.

5422. You feel perfectly confident, that if 150,000 stand of arms are required by the Government, they can be completed within two years?—Fully certain, provided the supply is insured for the third year.

5423. That is, supposing a regular demand is to be supplied for the Ordnance? Precisely so.

5424. Will you state whether it is not your opinion that it would obviate a great many difficulties, if one contractor were responsible for the delivery of the complete arm of each set which are included in his contract?—It would relieve the Board of Ordnance of all the difficulties that they appear to have encountered in procuring arms entirely, because the trade is fully equal to supply any number of

of arms that the Board may require; and how it is that they have had a difficulty in getting together the different materials I do not know, beyond the arbitrariness of the view.

5425. Do you propose, that if that system were adopted, the view should be given up?—Certainly not; the view must proceed as at present, or pretty nearly so; there are some superfluous views, in my opinion.

5426. You consider that the view could be maintained?—Yes, precisely as it is, in all the principal materials.

5427. If fairly conducted?—Yes.

5428. Then the use which you think a single contract for the complete arm would be to the service would be this: that the contractor would be better competent to negotiate for the completion of the contracts for the several parts, or to undertake the completion of the several parts, if they could not be contracted for by different parties as at present?—Exactly so.

5429. His superiority would consist, would it not, in his knowledge of the parties, and of the trade generally?—Yes; I may state that during a personal interview, Sir Thomas Hastings told us the difficulty that the Ordnance had had in getting ready the materials for those carbines, and we offered to supply 2,000 of them within a few months; I think four or five months; and if we had had that order, we should have done it undoubtedly.

5430. Should you, if you were contracting for the different parts of the musket, prefer dealing with some merchant who had contracted for the complete arm, knowing him to be a person competent to deal with the trade?—That is, if I were supplying the materials?

5431. Yes?—I should.

5432. Do you think that that practice is more conformable to the usual practice of the trade, in supplying other parties besides the Ordnance?—Yes.

5433. And more consistent with the general practice of trade?—Undoubtedly.

5434. Do you think also that this contractor might act as a referee between the Ordnance and the suppliers of the materials?—Undoubtedly he could.

5435. Are the Committee to understand that you think that the division of the contracts amongst different parties contracting for different parts with the Board of Ordnance has been an impediment to the supply of arms?—It undoubtedly has been in the present instance.

5436. Where there is any danger of strikes, that division of the contracts increases the danger and probability of the strikes?—Yes.

5437. Colonel *Boldero.*] With regard to the order which you received from the Ordnance for setting up 23,000 Minié rifles, will you detail the work you had to perform in that?—We had to stock the gun, to screw together the gun, to percussion the gun, to rifle the gun, to sight it, to polish it, to engrave and brown it, to finish the stock, and to finish the entire gun, and make it perfect.

5438. What does the stocking cost?—The stocking cost 3 *s.* 7 *d.*

5439. Lord *Seymour.*] Do you employ machinery in the setting-up of the musket?—In the setting-up we do not employ much machinery; we only employ it in several minor parts of it; we do not employ it either in stocking or screwing together the gun.

5440. In the parts of the work which you undertake to perform, do you employ much machinery?—No, we do not; that portion which we undertake to perform is the portion where the least machinery certainly has been hitherto employed.

5441. Have you considered the possibility of introducing further machinery with a view to reduce the cost?—There is not the least doubt of the possibility of introducing machinery to stock and screw together the gun, and at a small additional reduction in cost, but not anything like the reduction that has been spoken of. If the Committee go into the calculation, as given by Mr. Whitworth, it will be found that such is the case.

Mercurii, 29° *die Martii*, 1854.

MEMBERS PRESENT:

Sir W. Molesworth.	Lord Seymour.
Mr. Muntz.	Colonel Boldero.
Mr. Monsell.	Mr. Newdegate.
Mr. Geach.	Colonel Lindsay.
Colonel Dunne.	Mr. Walpole.
Lord Paget.	Mr. G. Dundas.

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Mr. *John Field Swinburne* called in; and further Examined.

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5442. Mr. *Muntz.*] YOU were examined yesterday with respect to the artillery carbines; will you state now when you received the materials for setting them up?—The first materials were received on the 7th of November; 100 sets.

5443. What was the period of time within which the contract was to be completed?—The contract was to be completed in six weeks after the usual time allowed for setting up, which is eight weeks.

5444. In six weeks from the delivery of the materials?—Yes; that would make 14 weeks.

5445. Were the materials complete when they were delivered?—No, they were not; the sights that were issued with the first materials were incorrect, and they were returned into store.

5446. How long did that hinder you?—The first correct ones that were received, except 20 which were received for trial, were received on the 16th of January 1854.

5447. Were those the first that were received complete?—The first that were received correct. The first 100 sights that were received correct were received on the 16th of January 1854; there were 18 or 20 received previously to that, in the last week of December.

5448. What time did that hinder you?—We could not proceed with the guns beyond the screwing together.

5449. What time were you hindered by that?—From the 7th of November, the date of the receipt of the first materials, till the 16th of January; two months.

5450. What were the terms of the contract with regard to the delivery?—They were to be delivered in six weeks after the usual time for setting up, which would make 14 weeks after the receipt of the materials.

5451. Was any complaint made on account of the non-execution of that contract?—Yes; we received a letter from the Board on the 14th of January, I believe; I have not got it here, but it was a letter from the Board requiring to know why they were not delivered according to the contract, and we said that up to the 31st December we had only received from the store 500 sets of materials, and also that we could complete the order within the time named, providing there were no delays in the execution of that part of the work which had to be done in the machine-room of the Board.

5452. Was there any cause of delay besides the incorrectness of the sights?—No, there was no cause of delay besides the incorrectness of the sights, except the non-receipt of the materials.

5453. Mr. Lovell has stated that there was a profit of 7 *s.* 5 *d.* on the setting up; is that correct?—There was a profit of 7 *s.* 5 *d.* previously to 1849, but that profit was not the profit demanded by the contractor, but it was fixed by Mr. Lovell as the proper profit; it was extravagant, in my opinion; but he not only fixed the profit but the prices to be paid to the workmen. I think that the cost

of

of setting up in that instance was under 19 *s.*; I am not prepared with the figures, I think it was under 19 *s.*, and the profit was 7 *s.* 5 *d.*

5454. Lord *Seymour.*] When was that?—It was previously to throwing open the tenders by contract; that system terminated in March 1850, I think.

5455. Mr. *Muntz.*] After the Committee had sat about the contracts?—Yes.

5456. There was a profit of very nearly 35 per cent., was there not?—Yes; but that was so in all the departments of the gun; it was all fixed by the inspector.

5457. What reduction have you made in the present contract as compared with former contracts?—With regard to the first contract that we took, the price fixed by Mr. Lovell was 16 *s.*, but we took it at 12 *s.* 9 *d.*

5458. The materials and wages being the same?—Precisely; that estimate refers I should say to the line musket; we had had no line muskets to do; then the Minié rifle is the same, excepting it being a rifle gun; that gun we took at 23 *s.* 6 *d.*, and the additional cost of the rifling and sighting of it brings it down to 20 *s.* I think that the contract price of the line musket was 26 *s.* 3 *d.*

5459. You made a reduction in your charge of 6 *s.* 3 *d.* out of 7 *s.* 5 *d.* for the setting up, did you not?—We reduced the cost of the gun 6 *s.* 3 *d.*

5460. Mr. *Monsell.*] You stated, did you not, that your principal difficulty in setting up muskets for the Ordnance was the difficulty you experienced in getting the materials in time?—That has been the only difficulty in the present instance.

5461. Have you not, in a letter to the Board of Ordnance, mentioned other difficulties also?—Yes, we have; we have stated difficulties in reference to the workmen.

5462. Will you just, in a few words, mention what the difficulties have been that you have experienced in that way?—I stated yesterday that we did apply for an extension of time, at the commencement of the contract for the 23,000 rifles; but we also stated our willingness to proceed at once if the Board desired it, and we gave, as reasons for that application, the difficulty which we had experienced with the workmen in getting them to proceed, from the presumption or feeling on their part that, if they worked at the prices that we offered, they could not get their work marked in the view rooms. That influence proceeded from the viewers in the establishment in Birmingham. We then asked, or we had asked, to have a resident officer appointed in Birmingham, to prevent that influence; that influence has been exercised more or less in every department of the establishment there, and by which the prices have been very much enhanced.

5463. What influence do you refer to; will you describe it?—It is something like this: a man goes down, in the first place, to the view rooms; we have never had a pattern; the inspector of small arms has refused us that, consequently we have no pattern to show to the workmen, and we must send a workman to the view rooms to see the pattern; and when he gets there, the viewer puts the pattern into his hand, and says, "We shall view this up to the mark; we shall keep you up to the mark." That is understood to mean, that unless the workman has a certain price, he will not be able to get his work passed, which price is understood between him and the trade generally.

5464. And he conceives that he will have to execute the work in a very superior way?—Yes.

5465. There is a difficulty, of course, in the first instance in what you state as to the pattern, but I presume that the jigs and gauges are all made by the contractor, and that he has an opportunity of making them all in a way to accommodate them to the work that he has to do?—Yes; but the viewers dictate what jigs and gauges shall be made and used, and the contractor is not allowed to have an opinion upon that point, nor the workmen.

5466. Is that unreasonable when the work is to be done up to a certain pattern?—I do not say that it is unreasonable; I do not think it is; but that discretionary power ought to be exercised with wisdom and with justice, and I know that that has not always been done. I know that with the artillery carbines, had we submitted to the jigs and gauges proposed by the inspector, we could not have executed the contract. We did not submit; we had a conversation

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versation with Sir Thomas Hastings, and he requested us to refer any difficulty to Mr. Gunner. I think we applied to the Board about the 3d of January for that purpose, and Mr. Gunner was sent down afterwards, so that we were able to proceed.

5467. You appealed to the Board of Ordnance and obtained redress, did you not?—Yes.

5468. Were you either yourself anxious, or are you aware that the other contractors were anxious, that the conditions of the contract should be concealed from the trade, as the workmen would be more extravagant in their demands, and more stubborn in holding out, if they knew the penalty that they were liable to, and was an application to that effect ever made on the part of the setters up to the Board?—Yes, that was under very peculiar circumstances, which I will explain. I should say first, in explanation, that the Minié rifle was a new arm entirely to the trade, and that so large a quantity as 23,000 had never before been contracted for, and the trade were perfectly unacquainted with that rifle. In the first instance there were two gentlemen, one in London, and one in Birmingham, who took 5,000 each of those guns, and both of them, from the combinations and the presumed probability of great loss upon that order, I believe memorialised the Board to have the contracts rescinded. We believed that we understood how to make the Minié rifle, and so confident were we in our minds of doing this, that we took up those contracts as they were thrown up; but the combination then existing led us, in the second instance, to ask the Board to withhold a knowledge of that fact from the trade, from the workmen, and from the viewers for some time, in order that we might make better arrangements with them.

5469. In fact, in consequence of the giving up of certain contracts by certain gun-makers in London, the number that you were to supply was increased?—Yes, 5,000.

5470. You did not wish the workmen, in the first instance, to be aware of that fact?—No.

5471. Do you think that if the number, instead of being increased by 5,000, had been increased by 20,000, that would have increased your difficulty with the workmen?—Undoubtedly it would have increased our difficulty with the workmen, as it would have been an increased quantity; still, I believe, that they might have been done, and they would have been done, providing we had been in a position to have ensured continuous employment to the workmen.

5472. You have stated that if you could ensure continuous employment to the workmen you could produce a very large number within the next three years?—Yes.

5473. Will you state what the number would be that you conceive you could supply?—We stated 50,000 in the first 12 months, 100,000 in the second 12 months, and a larger number in the third; we did not state the number.

5474. Did you state at what price you could supply them?—No.

5475. Can you make any statement to this Committee as to the probable price, if so large an order were to be given to you, and extending over so long a time?—I cannot state a definite price, but it would be less than the present contract price.

5476. Have you made any calculation at all as to what the price would be?—A great deal would depend upon the manner in which the gun was to be viewed. I believe that the inspection hitherto upon the materials of that musket has been inconsistent with either reason or justice. With a fair view, with a view maintaining the quality in all its integrity, as it is now, the price would be reduced very materially.

5477. Be good enough to state what you mean by a fair view; do you mean that the jigs and gauges should be changed?—I do not mean that.

5478. Do you mean that any part of the view should be given up?—No, not as regards the quality.

5479. Are the Committee to understand you to mean this: that the existing regulations should be fairly carried out, and not carried out in an oppressive way?—Yes.

5480. It is not the regulations that you object to, but the mode in which the regulations have been carried out?—Yes, the mode in which the regulations of the view, in reference to those materials, has been carried out has been so oppressive

oppressive that no man could produce the supply. I have seen materials of every description rejected for faults; and the viewer could not tell that there was a fault at all if the marks had been rubbed off, and the materials had been sent again, and another man had received them.

5481. Is it not rather strange that in such a state of things, with so much oppression as you describe, there was no appeal made to the Board of Ordnance?—It is; and I cannot account for it in any other way than this: that I believe that the inspector of small arms has exercised greater power over the gun trade than the Master-general of the Ordnance, previously to the last few months.

5482. If the Master-general of the Ordnance was never appealed to, he could of course never exercise any power?—I think in some instances he has been appealed to, but the inspector's power was supreme; it was understood and felt so in the trade.

5483. Take the case in which you complained, with regard to the 2,000 artillery carbines; there you had immediate redress, had you not?—Yes; and I have no doubt that if others had complained they would have had redress, but they were afraid of complaining.

5484. You stated yesterday, did you not, that in your opinion the present system of contracting for the separate parts of the musket was not a good one?—What I said was, that the difficulties which the Board had experienced in collecting those parts would be entirely dispensed with, if they had one responsible party, because the trade was fully competent to produce any quantity that the Board wanted.

5485. You are aware of the fact that the Board have not been able, using the best exertions that they could, to obtain a sufficient supply; do you conceive that by changing their plan they would be able to do so, carrying out the existing regulations with regard to the view fairly, and contracting for the whole musket instead of for the separate parts?—Yes.

5486. Colonel *Boldero.*] Is that opinion shared by many of the manufacturers in Birmingham?—I should say, if I was a material maker, that I should not share in that opinion; I think I should prefer supplying the Board of Ordnance to a private manufacturer; but, if the Board of Ordnance experience a difficulty in getting a supply by that means, they will experience none if they give the order entire to a gun maker.

5487. Mr. *Monsell.*] How would your plan be carried out, suppose you contracted with the Board for 50,000 muskets, how would you propose the view to be conducted?—That each component part should be viewed as it is now.

5488. You propose that all the component parts should be viewed in their several stages before they were put together, at the establishment in Birmingham?—Yes.

5489. You would suggest that the view should be conducted precisely on the same principles as it is now?—Precisely.

5490. Would you make your materials, or contract for them?—That would be a matter of detail; we should contract probably for the materials, and if we met with any difficulty in getting them, we should make them at once ourselves.

5491. Is it your opinion that you would obtain your materials from the contractors, or do you think that you would be obliged to make them yourselves?—I think that we should get them from the contractors; but if we found a difficulty in getting a supply, as the Board of Ordnance have done, we should immediately make them ourselves.

5492. Supposing that you obtained them from the contractors, what facilities would you have in getting them beyond that which the Board of Ordnance possess?—We should have the facility of making as well as understanding the trade; and being in daily communication with members of the trade, in any difficulty that we met with, any contractor that was short or neglectful of his contract, we should immediately supply his place by making the article ourselves.

5493. Would you introduce machinery for that purpose?—Yes.

5494. Would it be worth while, supposing such a contract be given to you as that which has been spoken of, in those three years, without the certainty of anything beyond the three years, to set up machinery upon a very large scale?—We should set up machinery with the certainty of three years, presuming that we should have a continuance of the Ordnance contracts after that, if we could supply the Ordnance on as good terms as any other manufacturers.

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5495. Will you just mention the different parts of the musket which you would propose to make by machinery under the circumstances described?—There is but one part of the musket but what machinery is already applied to, and that machinery can be applied to, and that is the stock; that is a question, I think, of economy altogether.

5496. You have no doubt that the stock of the musket can be made equally well by machinery?—No; but I have very great doubt as to its being done for less than it is now.

5497. What do you say as to the bayonet?—That can be produced with greater facility than now, there is no doubt of it, and at less cost.

5498. Are you able to speak as to the application of machinery to the lock?—The lock is now made by machinery, and I think it is only a question of power, whether the power employed is manual power or steam power.

5499. Do you conceive that the machinery which is now used in lock making can be considerably improved?—Yes; no doubt of it.

5500. With advantage?—With some small degree of advantage. It is being employed now. There are lock contractors now to the Board who use machinery to a great extent in making locks; in fact, in making what we call machine locks.

5501. The mode in which you would propose to deal with the difficulty, if the makers of materials were to disappoint you, you having contracted with the Government, would be to set up a manufactory for yourselves?—We should.

5502. In fact, you would do very much what the Government are now proposing to do?—Yes; only we should do it cheaper.

5503. Mr. *Muntz.*] Do your remarks refer to this identical gun? (*pointing to the same.*)—To the pattern of 1853; the 1853 Minié rifle.

5504. With regard to the view, when you speak of a fair view, what you intend is, that the view should be appealed against in case of difficulty?—Yes.

5505. Is that what you call a fair view?—No.

5506. Would that be a fair principle?—Yes.

5507. You would take into consideration, would you not, that the former inspector and the present inspector are very different people?—From what I have seen I should say that they are decidedly. Under the late inspector, according to the mode in which he ordered the viewer to view those materials in the late contracts, there was no latitude at all; the man was given the pattern and the written instructions, and he was ordered to view up to those instructions; and I say, as a practical man, that I could return 90 out of every 100.

5508. If a man chooses to be vexatious in his view, no price would be equal to it?—It would not, and the supply could not be made.

5509. Mr. *Monsell.*] Do you think that it would be very safe to give any very great latitude to the viewer, in viewing the articles that were sent to him?—I think that the viewer ought to be a man of sufficient sound judgment, and honesty of purpose, to know what to reject and what to receive, and I presume that he is paid for that ability. If you only want a man to jig and gauge, you may get a machine to do that.

5510. When there are a great many different viewers, those viewers, if any latitude were given to them at all, would be likely to vary in their use of that latitude, would they not?—They might, but you must give a certain discretionary power to the viewer.

5511. Still, can you arrive at unity without leaving questions of dispute to be settled by a Court of Appeal?—The difference in the uniformity of the parts of the musket would be so slight under a system of view similar to that adopted at the East India House, that no one would detect it; I venture to say that the India muskets are as uniform as the line muskets.

5512. You approve of the system pursued by the East India Company?—Yes; so far as I can judge, I think it is very fair.

5513. Do they obtain their muskets cheaper than the Board of Ordnance?—I believe they do, a little.

5514. Mr. *Newdegate.*] Is their supply more regular?—The East India Company have never found any difficulty in getting any supply that they required.

5515. Mr. *Monsell.*] Are you acquainted with Mr. Serjeant, who I think was a contractor?—Yes.

5516. Is

5516. Is he a person of experience?—He is a gun maker connected with the oldest firm in Birmingham, but he is not a practical man.

5517. Was he not for a long time a contractor?—Yes.

5518. There was a Mr. Wheeler, was there not?—Yes.

5519. Is he a man of experience?—He is not a practical man either, he was brought up as a draper.

5520. Mr. *Muntz.*] And Mr. Serjeant at college?—I believe he was.

5521. Knowing the old inspector, and knowing the practices that he allowed, I presume that you did not like to complain, because you knew what the result would be?—That has been the feeling in the trade; but so far as we are concerned in the setting-up contract, we have always complained when we thought it necessary.

5522. What is the feeling among the men themselves on that subject; do they like the idea of any complaint being made?—No, they do not complain, and they will not complain. The workman thinks that he should lose his bread entirely if he complained of the viewer.

5523. Has not the workman almost invariably found, if he complained of the viewer, as Mr. Brazier shrewdly remarked, that he was sure to be made to pay for it?—Yes.

5524. Mr. *Newdegate.*] You have been asked why the trade did not appeal to the Board of Ordnance; did they not appeal in 1852?—I believe they did. I think I stated that a portion of the trade had appealed.

5525. Do you know what the result of that was?—I do not of my own knowledge.

5526. Have you not heard that the result of that appeal was, that the whole of the complaints were ignored?—I am not aware of that.

5527. With respect to an appeal, is your notion of an appeal this, an appeal to the Government, who is the party to be supplied; or is this your notion of an appeal, an appeal to an indifferent party, who is disinterested?—If there is an appeal it must be to an indifferent party. I presume that the Board of Ordnance, not being practical men, cannot know anything about the questions that would arise in a case of appeal.

5528. Are not the Board of Ordnance interested parties, being the purchasers?—Decidedly.

5529. Mr. *Monsell.*] How are they interested parties?—I think that they are interested in favouring the reports of their own inspectors.

5530. How are they interested in that?—They would always give, and I think very properly, the doubt in his favour. I would here explain, that there is nothing more difficult than to prove the improper rejections in reference to small arms.

5531. Mr. *Newdegate.*] Are, or are not, the Board of Ordnance the customers of the trade of Birmingham for arms?—They are.

5532. Then, do you consider it fair to make the customers the arbiters as to whether the supply is properly furnished or not?—I think that it would be very desirable to have a Board of reference; I should say some two or three disinterested parties, men of practical knowledge, of honour and integrity.

5533. Who are not interested, either by themselves or their officers?—Yes.

5534. That is what you mean by an appeal?—Yes.

5535. Colonel *Boldero.*] You examined yesterday very minutely the Belgian rifle that was in the room, did you not?—Yes.

5536. The Committee have been informed that it cost the Belgian Government 44 francs, or 1 *l.* 16 *s.* 8 *d.* sterling; could that musket be made at Birmingham at the same cost?—Undoubtedly; I should be happy to take an order at that price for the same arm.

5537. Mr. *Monsell.*] Do you not agree with Mr. Gunner as to the additional price of the lock, the barrel, and the stock of our musket?—I agree with him that it is a sound arm, and a serviceable one.

5538. He stated what he considered to be the difference in the price between our lock and the Belgian lock; did you hear that evidence?—Yes, I did.

5539. Lord *Seymour.*] When you are not employed by the Government, do you make muskets for any foreign countries?—Yes.

5540. Largely?—Yes.

5541. Have you made of late years largely?—I have been making military

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arms for India during the last 12 months, and that has in part enabled me to keep my workmen together.

5542. Have you been making them for the East India Company?—No, not for the East India Company, direct. They are for the Scinde Irregular Horse.

5543. When you have an order to supply arms to a foreign Government, you obtain the parts from the contractors, do you not?—Yes, we do to a great extent.

5544. You obtain the lock and the barrel?—We obtain the barrel and the bayonet, and occasionally the lock.

5545. Do you make the stock yourself?—We buy the stock in the rough, and make it into the gun.

5546. When you have obtained the barrels from the contractor, do you have them viewed yourself?—We do.

5547. If you are not satisfied with the view, you reject them?—Yes.

5548. You do not allow any third party to come in, who is totally indifferent to that matter, and decide between you and the maker of the barrel?—No.

5549. Then why would you put the Government of the country into a position in which you would not put yourself?—For this reason: I hold myself to be a practical man, and competent to decide between my viewer and the contractor of the article, but I do not think the Government are.

5550. If the Government had under them able practical men, to whom an appeal might be made, you would be satisfied, would you not, with the decision of such persons?—If the Government had practical and efficient officers to whom those appeals might be made, and who would have to decide questions of that kind, they would never have to be referred to any Board of referees.

5551. Would you be satisfied with such a decision?—Perfectly satisfied.

5552. Can you state at all the price at which you are furnishing muskets to foreign countries?—We are furnishing muskets from about 10 *s.* to 30 *s.*

5553. Have you ever found the manufacturers of Belgium compete with you in foreign countries, or are you aware whether there is any such competition?—There is great competition between the manufacturers of Belgium and those of Birmingham in certain classes of arms.

5554. What classes of arms are they, the cheapest class or the highest class?—They are neither the one nor the other; they are a sort of medium class. I am not aware that the Belgian manufacturers can undersell the Birmingham manufacturers; the difference in the pattern between the English gun and the French, between the banded gun and the loop gun, gives an advantage to the Belgian manufacturer in some instances, because the pattern not being known in Birmingham, or little known, there have often been difficulties experienced in making guns of that particular description. I had an order some two or three years ago for one of the South American governments for 2,500 banded carbines, the pattern of which was a Liege carbine; but I made them at the same price, and since then I have had the order repeated to some extent, which is a proof that Birmingham guns were preferred.

5555. You have stated that if you ordered the parts of a gun from a contractor you would have this check upon him, that you would be able, in case he could not furnish the parts, to make them in your own establishment?—We should put down machinery at once to do that, if it were necessary.

5556. Then that which it would be wise for you as an individual to do, it might also be wise on the part of the Government to do; that is, to put themselves in a situation to make the parts themselves, in case they were not supplied by the contractors?—If the Government could produce the article for less than the contractors, I think it would be wise in them to have that check; but if they can purchase it at less from the contractor than they can produce it for, I do not see the necessity of their having that check.

5557. If the contractor fail to perform his contract, is it not an advantage to have a check upon him?—The Government already have a check. If one contractor fails, they have only to give out the contract in a different mode. They have found a difficulty in getting a supply of materials; but if they had given the order to me, or any one else, to have supplied the whole gun, they would have found that they would have got it.

5558. You think, although the Government could not get the materials themselves, that if they had ordered the whole gun from you, it would have been your interest to look after the different contractors, to get the parts of the gun together,

and

and that you would have supplied what was wanted?—I am certain that we should.

5559. Mr. *Muntz.*] Did you ever make any offer to the Government to supply the whole gun?—We offered, in a conversation that we had with Sir Thomas Hastings some time ago, to supply 2,000 artillery carbines, in consequence of the difficulty then experienced in getting them together. But I would state, with reference to the difficulty in getting those 2,000 carbines, that from a return which I have seen of the dates at which the material makers delivered those materials, the delay appears to have been almost entirely in the machine room of the Board of Ordnance. I believe that if the Board were to dispense with their machine room, and to have that portion of the work done by contract, they would save very considerable time. In the case of those 2,000 artillery carbines they would have saved four months.

5560. What was the cause of the great delay?—I cannot tell.

5561. Have you no knowledge whatever of the cause?—If I were to answer as a manufacturer I could tell the Committee, and I should say that it was the inefficiency of the people who had the control over that room.

5562. Do you mean the workmen, or the directors?—Both.

5563. Are they not competent to do a sufficient quantity of work?—I mean to say this, that those barrels have lain there from three to four months, and if we had had them to do by contract, we should have done them in so many days.

5564. Was any reason assigned to you why the barrels lay there so long?—No.

5565. Was any excuse made to you, when you wanted the materials, with respect to their being detained there?—No; the only reply that we got was, that they were not ready.

5566. You know that they have been detained three months at the rooms?—Yes, I know it to be the fact that the barrel-makers delivered their barrels in certain months, and that those barrels were not delivered out again in the second process until three or four months after that period.

5567. What period of time did you require for supplying those 2,000 artillery carbines?—I cannot speak confidently upon that; I think it was about five months.

5568. Have the Board obtained them yet?—They have not, nor have we got the whole of the materials yet.

5569. Mr. *Monsell.*] Was not the delay owing to the materials not being in possession of the Board to put into your hands?—872 is the number that has been supplied up to the 25th of March; the materials that we are now waiting for are swords.

5570. Still, at this time, the materials have not been supplied, therefore the carbines are not ready?—The whole of them have not been supplied up to this moment.

5571. Are you aware that, in the year 1839, the Board of Ordnance endeavoured to make contracts for muskets upon the principles that you have suggested, namely, contracting for the whole musket?—I am.

5572. Do you know that that failed?—I do not know exactly that it failed, because I think, if I recollect rightly, Mr. Wheeler took an order for a certain quantity, and executed that order; but I know this, that the inspector of small arms would not have allowed that system to have worked.

5573. Do you know that only one tender was received by the Board from Messrs. Miller & Son, of Holborn, at 96*s.* per musket, and that this was declined, the price being deemed excessively high?—I think the Board received letters, but they did not receive tenders. Mr. John Wheeler took an order at that time either by tender or contract, and he executed that order.

5574. Mr. *Muntz.*] What was the extent of that order?—I think it was either 1,000 or 2,000 line muskets, what was then termed the Lovell pattern musket, and he executed it without any delay.

5575. Mr. *Monsell.*] According to your plan, you would first, for your own protection if you were a contractor, view the materials as they were brought in to you, and then take them down to the establishment at Birmingham, where they would then be viewed precisely upon the same principle as now?—Yes.

5576. The change you think would make this difference, that the Board of Ordnance, who have not been able to get any considerable supply for several

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years, would be able to obtain a very large supply, or as large as the country required?—Undoubtedly they would.

5577. Colonel *Lindsay.*] You are in favour of one contract to supply the arm?—The Board would find no difficulty in getting them under that system.

5578. You do not agree with the evidence that has been given by Mr. Brazier before this Committee, in which he stated that he thought the system was best as it is now?—I do not admit that there is a difficulty in getting a supply either by one means or the other.

5579. In Mr. Brazier's examination, he was asked if it would be better that the Government should contract with one contractor for supplying the materials composing the gun, and he said that he thought the system was best as it was at present; do you agree with that opinion?—I do not.

5580. Mr. *Muntz.*] Mr. Brazier takes no part in gun making, does he, except as to the lock?—I believe not.

5581. Mr. *Dundas.*] Are you aware whether a great number of houses in Birmingham could supply the Government with 100 guns a week, or are there any houses in Birmingham that could supply 100 guns a week?—Many.

5582. Could those houses supply the Government with 200 weekly by a little extension of their premises?—No question about it; I should say that the gun makers in Birmingham could supply the Government with as many thousands if necessary.

Mr. *John Stephenson*, called in; and Examined.

Mr. *J. Stephenson.*

5583. Mr. *Muntz.*] DO you reside in Birmingham?—Yes.

5584. What is your trade?—A gun lock filer.

5585. Have you ever had any contracts with the Board of Ordnance?—Yes.

5586. What for?—For 10,000 scears and tumblers.

5587. When was that?—On the 7th of November 1851.

5588. That was after the alteration in the mode of contracting, was it not?—No; that was the first of it, I believe.

5589. Did you fulfil your contract?—No, I did not.

5590. What price did you contract for?—Seven shillings per 100.

5591. What had the former price been?—Twenty-five shillings.

5592. You did not fulfil that contract, did you?—No.

5593. How many did you supply?—One hundred and fifty.

5594. Did you get paid for them?—No.

5595. What was the reason for that?—I gave it up under the system of viewing.

5596. Did you take the locks back?—No, I did them on the premises.

5597. Had you ever filed any of the same kind before?—Yes, a great quantity.

5598. Did you give satisfaction then?—Yes.

5599. Was the price of 7 *s.* a price that you were satisfied with?—I could have got a living at it if they had been looked at as they were when they were 25 *s.* a hundred.

5600. Why did you not complete the contract?—I gave it up.

5601. What was the difference in the view?—A great difference, in my opinion.

5602. What was the nature of the difference?—It is only a boy's job; there could not be any great art in it; a boy could be brought in to do it; it was very simple.

5603. You are a lock filer of Ordnance locks?—Yes, and I have been these last 17 years.

5604. Those locks were viewed, you say; but you took them back?—No, I left them where I did them; I did them on the premises at the Tower, in Birmingham.

5605. Then that quantity was passed?—None were passed.

5606. None at all?—No.

5607. Did you forfeit them?—Certainly.

5608. Mr. *Monsell.*] You were merely employed to make the scears and the tumblers?—No; to harden them and to free them.

5609. You did not supply the materials?—No.

5610. Mr.

5610. Mr. *Muntz.*] After those locks were done with in 1851, did you go on with your trade?—No, I went out of the lock trade into the sight trade.

5611. Why did you leave off lock making?—It was time when we could not get them passed.

5612. Was any reason assigned for that?—I had none myself; they were similar to what I had hitherto done at 25 *s.* per 100; but when the price was 7 *s.* I could not do them at all.

5613. Was anybody else placed in the same position that you were?—Yes.

5614. And have they left the trade from the same cause?—No.

5615. Was anything said to you about the difference in the price?—Yes, there was an item made in Mr. Lovell's office, and he said that it was a most awful price.

5616. What objection had Mr. Lovell to the price?—I do not know; but he said, "What an awful price you have got them at!" I expect it was too little.

5617. Lord *Seymour.*] When was this reduction in price made, from 25 *s.* to 7 *s.*?—About 1848, I think.

5618. Do you mean that the very same article that had been supplied before at 25 *s.*, was afterwards supplied at 7 *s.*?—Yes; I worked at Enfield at the time, at the manufactory there, and that was the price when they first came out.

5619. Mr. *Muntz.*] Do you think that this species of viewing is prejudicial to the trade, and generally prevents many men from working at it?—That has been the case very much.

5620. This work was all done in Birmingham, was it not?—Yes.

5621. If the view was so vexatious as to prevent you from executing your work, the consequence, I presume, would be that other people would ask more for their work?—They would view to them before they had a job again.

5622. At what price?—The prices that they tendered for; I think it was 1 *s.* per 100 more.

5623. Did the parties that made them at 25 *s.* per 100 have the job afterwards?—Yes; after me, at 8 *s.*

5624. You had done no work before you offered to do it for 7 *s.*?—No.

5625. Those were the first that you did?—Yes.

5626. How have they got on since the other parties had the locks?—They have all gone, I suppose; I have not heard anything about it. I consider that they were inferior men to me in point of workmanship, but they got them passed; I could not.

5627. Would any one work at the trade that you do if he had to undergo such a view as you did?—I should say not; it would be almost impossible. If there was any thing to be got any where else, they would not do any at any price.

5628. Mr. *Monsell.*] You do not think that the other contracts were too strictly viewed?—The style of the view has been pretty good and straightforward since Mr. Gunner came.

5629. With regard to those contractors who took the contract at 8 *s.*, you do not think that they were too harshly viewed?—I should say not.

5630. Mr. *Muntz.*] In fact, Her Majesty's Board of Ordnance have paid just one-seventh more for what they had just to accommodate the whim of the inspector?—They were not inspected by the lock viewer, I believe.

5631. How are they inspected now?—They are inspected by the finishing viewer, I believe.

5632. Was he the person who inspected them when you made them?—I think not.

5633. Was there a man put on specially to view yours only?—I cannot say; I do not think he viewed them at all; he might pick out one or two, and turn them on one side.

5634. Do you know anything about any locks that were passed, your identical locks, from another lock maker?—Yes.

5635. From what lock maker did they go, the man who is now working upon that contract?—I cannot say whether it was Duce or not; it was either Duce or Francis.

5636. Were the locks passed as another man's make?—No; I should say they had been received as my make. I let them lie by for some time, and sold them to another contractor, and he sent them in, and I heard no more of them.

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I think it was either Duce or Francis. I sold them to Francis, but he sold them to another contractor.

5637. They passed round, and then they were received as good work?—Yes, they were passed, I have no doubt.

5638. Are you filing locks now?—Yes.

5639. Colonel *Lindsay.*] To whom did Francis sell them?—They went amongst the contractors.

5640. Mr. *Monsell.*] How do you know that they went into the Ordnance establishment at Birmingham?—They must have gone in; I can state positively that they did go.

5641. How do you arrive at that positive knowledge?—If they had not gone, I should have received them again to have done alterations, that is the only reason.

5642. Mr. *Muntz.*] You sold them subject to being approved?—Yes.

5643. If they had not been received, they would have been returned upon your hands, would they not?—Yes.

5644. Mr. *Monsell.*] When did you give up your contract?—In 1851; a few weeks elapsed before I gave it up, perhaps a month.

5645. This was a contract for 10,000 scears and tumblers for the line?—Yes, the line; the roundshank line musket.

5646. Do you say that when you yourself were employed, you saw other contractors' scears and tumblers pass without any view at all?—No, not when I was in the employ.

5647. Were you in the establishment after you were in employment?—No; I left the establishment, but I still worked under Government for contractors.

5648. Do you know what sort of view the scears and tumblers that were made by those other workmen were subjected to?—The view is nothing; I do not consider that it requires any view. The lock is tried up and down, to see whether the springs are right; we harden the scears and tumblers, and the bents are bright.

5649. Mr. *Muntz.*] Are you filing any locks now?—Yes.

5650. For the same trade?—Yes.

5651. Are you a contractor?—No; I file for other people.

5652. Has there been any alteration in the view since you were a contractor?—Yes.

5653. Is it better now?—Yes, it is very fair.

5654. Have you ever heard whether the viewer had any written instructions?—Yes; I have heard of them, and I have seen them, and heard them read.

5655. Are there any written instructions now?—There were a very short time back.

5656. Do you think that you do your work any better now than when it was refused?—No.

5657. You are satisfied that, in the first instance, it was properly done?—Yes.

5658. Can you say positively why it did not pass?—I cannot.

5659. Had you no reason given you?—No.

5660. Did you ever apply to the inspector, Mr. Lovell, about it?—Yes; and he said that they were not done properly.

5661. Did he show you what was improper about them?—He said that the bents were not free, and the work was not done properly; and I said they were done equally the same as they were when I did them for 25 *s.*

5662. Did he say anything to you about the price?—Yes; that it was an awful price. He said, "What a price you have got them at!"

5663. Colonel *Dunne.*] Did he mean that the price was too low?—Yes; it could not be too high.

5664. Mr. *Muntz.*] What did you say to that?—I smiled, and I said that it was rather low.

5665. Have the inspectors been more severe in their inspection since the trade was thrown open than they were before?—Yes.

5666. Is that generally understood in the trade?—It seems to be the general feeling; there is that cry.

5667. Have you heard the opinion of other people expressed who have been subjected to the same view?—Yes, many times.

5668. Does their opinion confirm yours?—Yes.

5669. You think that it has been the general complaint that the views were not fair?—Yes, it has been.

5670. Is the view better now?—Yes, it is a very straightforward and fair view now, and no man need grumble.

5671. Did you file any locks for the order of 1851, for any other contractor?—Yes.

5672. Besides those that you sent in yourself?—I filed, I think, one half-dozen. I went to work on the sights afterwards.

5673. Did all those pass?—I never saw them again. The general rule is, that if a man sells them to a contractor, if a thing is not allowed, it is returned to him, and he marks it with his name.

5674. Have you heard any description of the instructions that were issued?—Yes.

5675. Do you think, with such instructions as these, any viewer could pass locks fairly?—No. What we call the pattern lock is made by a first-rate workman, and he has a first-rate price; and that lock will cost from 30 *s.* to 2 *l.* Those instructions are made out according to this lock, and a party files them for 5 *d.* or 10 *d.*, and the viewer reads over to him the instructions, and tells him that he must make up to the pattern; that he must file equal to the pattern; and if he keeps up to those rules, it is almost impossible to pass one.

5676. The natural tendency would be, either to have no supply, or to raise the price of those that were supplied?—Certainly.

5677. Colonel *Dunne.*] You say that the pattern is worth from 30 *s.* to 2 *l.*?—Yes.

5678. When you put in a tender for a contract, are you not fully aware that that is to be the pattern?—I work for contractors; I am no contractor myself.

5679. When a pattern in any contract is given, does not the contractor, when he makes that contract, do it with his eyes open?—Yes.

5680. Is there any unfairness on the part of the viewer in requiring a fulfilment of the contract?—The viewer has his orders, and he acts up to his orders.

5681. Does not the contractor engage to perform the work up to those orders?—Yes.

5682. Mr. *Geach.*] You stated, did you not, that it is impossible to make a lock according to the pattern at the price?—Yes.

5683. Does not it follow, that as they cannot be made for the price, one man may be required to do more than another?—Yes.

5684. And yet the inspector may be supposed to be doing his duty?—Yes, according to his orders.

5685. When you spoke of those locks at 25 *s.* a hundred, you did not make them?—No, it was the hardening of the tumblers at 25 *s.* per hundred.

5686. That price was reduced to 7 *s.*, was it not?—Yes.

5687. When you hardened those tumblers at 25 *s.* a hundred, for whom did you do them?—For the Government.

5688. Were you a contractor direct for them?—Yes, for them.

5689. Then, as I understand, you worked for a contractor?—I do now.

5690. In that instance you worked directly for the Government?—Yes.

5691. At 25 *s.* a hundred?—No; then I worked at the Government manufactory at Enfield Lock.

5692. You worked at Enfield, did you?—Yes, for 10 years.

5693. Then you got 25 *s.*?—Yes, per 100.

5694. When you came to Birmingham you had to do the same thing for 7 *s.* per 100, had you not?—Yes; when the contract was thrown open, I had a tender sent to me, and I put in that price.

5695. Were those things that you made at 7 *s.* as good as those that you made at 25 *s.*?—The workmanship was the same.

5696. And yet they could not be passed?—No.

5697. Those that you made at 25 *s.* were passed, were they not?—Yes.

5698. You had a difficulty in passing those that you made at 7 *s.*?—We could not pass them at all, and they never were passed.

5699. Mr. *Muntz.*] How long does it take to file a pattern lock?—I have known it take from five to six days.

5700. Did you ever file one?—No.

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5701. What is the reason that the filing of the pattern takes so much time?—Because they are up to those nice, frivolous, little points.

5702. Does any body understand when he takes an order, that the articles are to be so exactly alike, that you could not tell one from the other?—No; I should say that they hardly expect that.

5703. But they do view them upon such a principle?—Yes.

5704. Can they be made at the price for any one to live by it?—No.

5705. What do they pay for filing a pattern lock at Enfield?—It ranges from 30 *s.* to 2 *l.*, I have no doubt, the cost of it.

5706. Each pattern?—I cannot say of late years, but it was so when I was there; it is six years since I left.

5707. Suppose that there was to be a fair view, and that the article should be substantially good in every way, though not viewed in that fantastical way, do you think that a man might be able to get a fair living, and make a large quantity?—Yes, under the present view, it would do very well.

5708. Mr. *Newdegate.*] When you had these locks at 25 *s.* per 100, did you do any quantity of them?—Thousands.

5709. Was the price reduced at all while you were at Enfield?—Not at all.

5710. The average price of this work at Enfield during those 10 years was 25 *s.* per 100?—Not the whole of that time; they had not come out, it may be, for about two or three years.

5711. That very work which cost 25 *s.* at Enfield, is now done at 8 *s.* in Birmingham?—Yes.

5712. Mr. *Monsell.*] What is it now done for at Enfield?—I cannot say exactly.

5713. Have you ever heard what it is done for at Enfield?—No; I do not believe that it is done at all now; they are what they call square shank-makers that do that part.

5714. At the time that it cost 25 *s.* at Enfield, what did it cost at Birmingham?—They were not doing any thing; they started a little while after, and I believe they were brought down to 12 *s.* 6 *d.* when they started at Birmingham.

5715. Mr. *Newdegate.*] When they first started in Birmingham the price was 12 *s.* 6 *d.*?—Yes.

5716. That was half the price that it cost at Enfield?—Yes.

5717. Now it is reduced to 8 *s.* in Birmingham, is it not?—Yes.

5718. Colonel *Lindsay.*] You think, do you not, that you made your contract too low?—It was very low.

5719. Was that caused by the system of tender and competition?—Of course.

5720. Mr. *Newdegate.*] Is the present price at 8 *s.* such as to enable the contractors to get a living?—Yes.

5721. With a reasonable view?—Yes.

5722. Lord *Seymour.*] How long were you employed at Enfield?—I think about 10 years.

5723. You have seen the system of view at Enfield, and you have also seen that in Birmingham, have you not?—Yes.

5724. Having seen both the systems, can you point out any material difference between the two systems?—Decidedly so.

5725. What was that difference?—There must have been a great difference, because when they were 25 *s.* per 100 I could go through the view, and when they came down to 7 *s.* I could not get any passed.

5726. Do you suppose that there was any jealousy at Enfield, lest at Birmingham they should be able to do this work at a much lower price than you could do it for at Enfield?—No, I do not suppose there was.

5727. At Enfield, were you paid by piece-work?—Yes.

5728. All the time that you were there?—No; sometimes by day-work.

5729. Was it the general system in the manufactory there to do all by piece-work?—Yes.

5730. Mr. *Monsell.*] What wages did you make at Enfield when you got 25 *s.* per 100?—5 *s.* 6 *d.* when on day-work.

5731. When you were working by contract, and you were receiving 25 *s.* per 100, how much did you earn a day?—I could not say exactly; it ranged.

Mr. *Isaac Brentnall Sheath*, called in; and Examined.

5732. Mr. *Muntz*.] YOU are one of the contractors in Birmingham, working for the Board of Ordnance?—Yes.

5733. What do you contract for?—For setting up guns.

5734. What was the cause of the contract of 1851 not being completed at the time agreed upon?—The principal cause was on account of our not having materials, and the pattern was not decided on by the Board of Ordnance to enable us to proceed with it.

5735. Had you not a proper pattern given to you at first?—No; we never have patterns allowed us.

5736. How could you contract without?—We do it; we ought to have patterns, but we never have any.

5737. As you had not a pattern supplied to you, you must have had access to one?—There is a pattern left at the view rooms, which we can see; but I consider that a very unsatisfactory manner of transacting business. I think that every contractor ought to have a pattern.

5738. How do you manage to file your jigs and gauges correctly?—The pattern is placed in the viewer's hands, and we send a workman down to the viewer to have our jigs made in his presence, and then he explains the different points that he wants attended to.

5739. Would it not be better if every contractor had a pattern for his own reference and his own work?—Certainly; and in all other contracts we have patterns.

5740. At what date was the pattern finally settled as to this order?—We were not able to proceed with the finishing of the muskets before the 16th of July 1852.

5741. What time do you consider that you lost by that?—There was a loss of about six or eight weeks, I think.

5742. Was that the only time you lost upon this contract?—No; there was a great loss of time at the latter end of the order, about February 1853, in consequence of the sights not being upright with the stocks.

5743. What time did you lose by that?—We must have lost perhaps 16 or 18 weeks altogether.

5744. About four months?—Yes.

5745. At what time was the last of the materials delivered to you in that contract?—The chief of the materials were delivered in January 1853 (I do not remember the date), for the 1851 order; it was as late as July 1853 before we had the whole of the sights for these muskets.

5746. Do you happen to know when the first 1,000 barrels were delivered by the barrel-makers?—I do not, but I believe it was some months before we had them to set up.

5747. Did you ever hear what the cause of that delay was?—I never heard what it was, but I believe that great loss of time was caused in the machine room at the Board of Ordnance in getting the portion of the work executed that is executed by the Board.

5748. Do you think that if that work had been done by you, instead of by the Board, that delay would have been avoided?—We should have performed the work perhaps in as many weeks as they took months.

5749. When did you receive the first 1,000 sets of materials?—I think it was about the 7th of March; I am not sure.

5750. Can you tell the Committee all the work that is done in the machine room?—They cut up the breech end of the barrel for jointing the lock, and they put in the nipple.

5751. Have you a proper means of doing that?—Yes, and have had for many years.

5752. Could you do that at the same price that it is done now?—I do not know what it is calculated at; but I am confident that we can beat the Government, whatever the price may be.

5753. What time was lost altogether in that order?—I should think about 16 weeks.

5754. Supposing that those barrels had been delivered to you direct, instead of being machined at the machine room, what time would have been saved?—

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I do not know exactly what time; I do not know the difference of the time between the barrel makers delivering the barrels to the Ordnance, and the date when we received them; but if they had been delivered straight to us, we should have performed the work probably in two or three weeks, that would remain in the machine room two or three months.

5755. Do you know what time it takes the Board of Ordnance to make a musket?—From the commencement, the giving the order out to the barrel-makers, it is impossible for us to get up a musket under 26 weeks.

5756. A finished musket?—Not if we are at work under the regulations laid down by the Board of Ordnance.

5757. What does that arise from?—From various delays and hinderances.

5758. Do you mean on the part of the Board, or on the part of the manufacturers?—It is not in the manufacturers' hands; if the barrel-makers deliver a quantity of barrels to the Board, they would not reach the setter up under, I think, about 16 or 17 weeks.

5759. How long would it take you to make a musket in your own way?—If we had the barrel directly from the Board, and did the machine work ourselves, we should be able to send the barrels in in about 10 weeks at the outside.

5760. Supposing that you made them from beginning to end, how long would it take you?—We should save a week or two. We should commence setting up as soon as the barrel-makers delivered the barrels to us.

5761. Much has been said about machinery, and the advantages and disadvantages of it; do you use much machinery in your manufactory?—We use a great deal, and have done for a number of years.

5762. Do you think that any increased quantity of machinery can be used in making muskets with advantage?—It all depends upon the demand. If there is a great demand, machinery might be introduced to advantage for the stocking of the gun; but, past that, machinery cannot be used to a greater extent than it is at present.

5763. Have you ever seen a gun stocked by machinery?—No.

5764. Have you made any calculation as to what that would cost?—Yes, we have gone into it.

5765. What saving would arise from it?—It all depends upon the demand. If that demand be great, there would be a saving; if there happens to be sufficient manual labour in the country, there is no saving at all.

5766. Is the work as good?—Quite as good. You could not make a musket by machinery altogether; you must finish it by manual labour.

5767. Suppose it was all made by machinery or by hand, by which process could you make the largest quantity?—I should not think of introducing machinery for stocking until I had exhausted all the power of manual labour. We can bring in a great number of workmen to gun-stocking and finishing without having recourse to machinery.

5768. Other skilled workmen could leave other trades and work at gun-stocking, could they not?—Yes; that is, if we could offer them an inducement to leave other trades for any length of time.

5769. You think that there is such a quantity of skilled labour that could be applied to such a purpose, that you could obtain it for the making of a large quantity?—Yes; but we could not draw those men off in a month.

5770. But you could by degrees?—Yes, there would be no difficulty then.

5771. Mr. *Monsell.*] With your present small orders you have stated, have you not, to the Board of Ordnance, that you have great difficulties on account of the combination among the workmen?—No difficulty but what we promised to overcome, if the Board wished it.

5772. Still you have frequently made that statement?—Whenever we have had any difficulties, we have asked the Board if we should proceed or not; and if we have been pressed to do so, we should have done it. We have never had difficulties but what we could very readily overcome, if required.

5773. When the Ordnance put up their machinery for percussioning the barrels, was there any similar machinery in the trade, or was the work done by hand?—There was machinery in private manufactories, I believe, for years past.

5774. Was it of the same sort as was set up by the Board?—I do not say that, but machinery that would do the work quite as well.

5775. Was it equally efficient machinery?—I think so.

5776. Before the Board put up this machinery, was all the work done by machinery equally good as that produced by the machinery that they put up?—I do not know how many years that machinery has been put up, but there has been machinery for many years; the stocking machine is nothing new, and if it could have been employed to advantage, it would have been employed long ago.

5777. Suppose that you had a large contract, extending over many years, from the Board of Ordnance, can you state what you could execute it for, supplying the present pattern?—I could not state off-hand; but we have not the slightest objection to enter into contracts, and the trade generally would do that, I have no doubt, for any supply that the Board required.

5778. Suppose that 100,000 muskets were required, could you state, within 5*s.* or 10*s.*, the price at which you could supply them?—Not now.

5779. Mr. *Muntz.*] Suppose that your contract was to extend over a great length of time, should you propose to put up more machinery, with the view of assisting those contracts?—Not without it was necessary, on account of a scarcity of manual labour.

5780. Do you think it is possible, from what you know of the gun-barrel making, to use machinery to a greater extent than it is used now?—I do not see how it is possible.

5781. Save and except drawing the outside of the barrel, everything is done by machinery, is it not?—It is machinery from one end to the other.

5782. Do you know anything about lock-making; whether any machinery is used for locks?—Yes, and has been for a number of years.

5783. For stamping the parts?—Yes.

5784. Can there be any increase made in the machinery for making locks?—No, I think not.

5785. Has there been any improvement introduced with respect to machinery for making bayonets, or any increase in the machinery?—Yes, there is a great deal of machinery used for bayonet-making now; but if there was a great demand, machinery would be used to a greater extent; but it does not pay the makers to use it on small orders.

5786. On a small order, the amount of outlay for the machinery would never be repaid?—No, it could not be.

5787. Have you any machinery now that is used for stocking?—No.

5788. Mr. *Monsell.*] Did you wish the Committee to understand, that if you had the large order which I spoke of, you would not at once proceed to set up machinery?—If we had not sufficient manual labour, we must have recourse to machinery.

5789. Still you would rather do it by manual labour, if you could find it?—I could not decide exactly.

5790. Did you not state that, supposing you had this large order, you would not set up machinery, unless you were driven to it by failing to find the amount of manual labour?—We should not set up machinery to stock the muskets unless we had a great advantage by it; and as long as we could get the work done as cheaply by manual labour as by machinery, we should not go to machinery.

5791. The question is, whether it is your decided opinion that you would get it more cheaply done by machinery than by manual labour?—We employ machinery as far as we can; whenever we see an advantage in putting it up, we do it.

5792. You do not think that machinery can be very much extended with advantage?—Yes, I do; but it all depends upon the extent of the orders.

5793. Assume that you have a very large order for some 300,000 or 400,000 muskets, what would you do?—It is probable that I should have to set up machinery at once.

5794. With regard to bayonets, do you consider that great improvements might be made in machinery for them, as compared with the present machinery?—I do not know as to any greater improvements than are at present known; it only requires large orders to have improvements carried out. I know bayonet makers that are now prepared to put down machinery; in fact, they have been for many years, and they had estimates for machinery for making bayonets, but then the small quantity of bayonets ordered from them will not warrant them in going to the outlay required.

5795. Is it not the case that there have been very large orders given to Birmingham by foreign countries independently of the demand from the Government?—

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ment?—They have been always supplied without having recourse to a greater quantity of machinery than they have now in use.

5796. Could the orders have been executed more cheaply if you had had recourse to machinery?—I should say not, so long as there is sufficient manual labour.

5797. Do you think that it would not be cheaper to extend machinery?—I know that in Belgium it was tried some years ago, but they have abandoned it on account of their being able to get the work done cheaper than by hand labour.

5798. Do you think that it would be cheaper to do it by manual labour?—That is uncertain; it all depends upon the extent of the orders.

5799. Suppose that you had an order for some 300,000 ar 400,000 muskets, do you think that you could execute that order more cheaply by setting up a considerable amount of additional machinery, or would it be better to rely upon manual labour?—We should put up additional machinery on account of the quantity.

5800. To a considerable extent?—I do not say that; to the extent of the requirement.

5801. With regard to the stocking, you stated, did you not, that you would put up machinery for that?—Yes; I do not require machinery for anything else. I have plenty of hand-labour, and I should not put up stocking machines unless we found that we could not get the work done by hand-labour. There is not that saving which has been represented to the Committee; and so far as we have calculated upon employing machinery for stocking, we should have to use a great amount of hand-labour afterwards to complete the musket.

5802. You stated that machinery had been abandoned in Belgium; is not the price of labour very much cheaper in Belgium than in Birmingham?—Yes, it is.

5803. Mr. *Newdegate.*] If I rightly understand your answers with respect to your employing hand-labour or machinery, you mean this: it must depend upon the extent of the order, and upon the supply of manual labour, whether you would employ machinery or not?—Certainly.

5804. And as the extent of the order and the supply of manual labour are two circumstances that you cannot determine, you cannot give a positive answer?—No, certainly not.

5805. Mr. *Geach.*] You have been asked whether, if you had an order for 300,000 or 400,000 muskets or rifles, you would put up machinery; you are aware that such an order as 300,000 or 400,000 muskets given to one house is out of the question, and you would not expect such an order as that?—We never had such an order.

5806. Supposing that there was a demand for 150,000 rifles a year, do not you think that there would be several persons in the gun trade who would compete for that order?—Yes.

5807. Or who would compete for parts of that order?—Yes.

5808. And if such a demand as that were to come regularly, each of those persons would lay out money in machinery in order to be able to secure the article at the lowest price, if he could sell it at a lower price by the adoption of that machinery?—They would certainly do that.

5809. And the reason why they have not done so now, for this particular class of muskets, is that there has been no certain demand?—I do not think on the average, for the last six or seven years, that there has been an average demand for 10,000 muskets a year of first-class workmanship.

5810. You were pressed to state whether you would manufacture a large quantity of rifles of the present pattern, and at what price; if you were allowed to modify that pattern, you could name possibly a lower price; could you not?—I could produce a gun equally serviceable and efficient, and a gun that would wear quite as long as the present one, at very little more than half the price.

5811. You heard the evidence of Mr. Anderson; he proposed to make certain alterations in the gun to suit the machinery, that he was to invent; suppose that you made certain alterations in the gun to diminish the labour in making it, you could then make it at a very much lower price, could you not?—Yes, we could; we had to pay in the last 12 months 25 per cent. more for just submitting to the whim of a pattern.

5812. With regard to strikes, you would not be more subject to them, if the gun trade were to increase, and if, instead of making 300,000 stand of arms in a

year, you made 1,000,000 stand of arms; you would gradually get a number of people together equal to the quantity to be made?—Whenever we have had any very large orders, we have never had any difficulty in executing them, and I do not think there would be.

5813. From your acquaintance with the gun trade, and the trade of Birmingham generally, you would probably agree that it is not because that the demand is a large one that a strike takes place in any particular trade, more than it would take place in that trade when the demand is small, and the number of hands small as well?—Certainly.

5814. Mr. *Newdegate.*] Is there not more danger or probability of a strike where the order is a small one, and the extent of it exactly known?—We always have to pay higher prices on small orders of that description, when they are wanted at any particular time, than on larger ones.

5815. There is more probability of a strike?—Certainly there is.

5816. Colonel *Boldero.*] Do not you think that the Government should be independent of any combination that could be made against them by the manufacturers in Birmingham or London?—Yes, I should say so; I do not see how they could be liable to combinations of the gunmakers in Birmingham; the competition is too great.

5817. Mr. *Newdegate.*] If there was an extended demand, and a combination among a limited number of gunmakers, others would come in to take the order that this combination had rejected?—I do not see how it is possible for such a thing to take place.

5818. Mr. *Geach.*] Are there many gunmakers now who do not take Government contracts, and who, if they found you were getting a higher scale of remuneration for the work, would become competitors?—Yes, there are many.

5819. Mr. *Muntz.*] With regards to the manufacture of guns and the labour required, whatever you do in the way of machinery, there must also be a large quantity of skilled labour to make a good gun, must there not?—It is so.

5820. Is there a sufficient amount of manual labour at the command of the gun trade to enable them to get the present contracts, or larger contracts completed, without difficulty?—There is.

5821. How many first-class muskets could be supplied from Birmingham per annum?—We offered, on behalf of the trade, to supply 50,000 the first year, 100,000 the second year, and a greater quantity the third year, and that could be done there is no doubt.

5822. You are satisfied that that might be carried out?—I believe so.

5823. Suppose that all the gunmakers and their workmen were fully employed, and you were pressed suddenly for a supply, what steps should you take to get on with the work?—We should get men from other branches; there are a great many gunmakers now at work at other trades, and we should have to induce them to come back to the gun trade.

5824. Have you ever been in that position?—Yes.

5825. When was that?—In 1848.

5826. What were you working at then?—We were at work at the Line muskets, and besides doing work for the Board of Ordnance, and the Board, I think, were never inconvenienced at all by the sudden demand for muskets that was made then in Birmingham and London for foreign Governments; we executed large orders for the Board of Ordnance; and large orders for the East India Company were got up in those years in London.

5827. Do you know what quantity the Board of Ordnance had in those years?—I do not; but I believe, for the Board of Ordnance and the East India Company, close on 100,000 muskets were made in each of those years, 1848 and 1849.

5828. Do you think that if any additional machinery were to be introduced, the men would object to it?—Not so long as there was sufficient employment for them; I do not think it would matter to them how many machines were at work if they had full work themselves.

5829. Have any of your men, who had served their apprenticeship to the trade, left it latterly?—A great number.

5830. What have been their reasons for that?—On account of the uncertainty of employment; we have been without work as much as 15 months at a time.

5831. In what year was that?—In the year from 1849 up to the latter end of 1850.

5832. Have they gone into other branches?—Yes; then we induce them to

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come back, with the promise of constant employment, they come for a few months, and then we were without work again.

5833. They employ their children at the same work, do they not?—Not to the extent that they did formerly.

5834. Why?—On account of the certainty of work years ago, you found that men employed their children one, two, or three generations, at the gun trade; there is nothing of that kind now; they will not bring up their children to the trade if they can help it, on account of the uncertainty of employment.

5835. Do you think that anything like consecutive orders or contracts would induce them to come back to the trade?—Yes; nothing else would. I could not induce many men to come back, if I could only promise them 12 months' constant employment.

5836. Suppose that you promised them work for three years, how would it be then?—Many would not come in, even then, without we made an engagement with them for three years.

5837. Supposing they were assured of two or three years' successive labour, would they then return?—I have not the least doubt that they would.

5838. Have you seen a good deal with respect to viewing the work in its different stages?—Yes.

5839. Have you seen the viewing merely as to setting up, or in any other way?—I have heard a great deal of it; I do not go into the view rooms very often myself.

5840. How has the viewing been with you?—Whenever we have anything the matter, we generally appeal to the inspector; but the setters up, I think, have but little cause for complaint. So far as I have heard, the barrel-makers, and the lock-makers, and others, have had great cause of complaint. I have examined rejected barrels and locks. I have seen a number of rejections.

5841. What is your opinion of these?—The mode of inspection is very vexatious, and unnecessarily strict.

5842. What has been the effect upon the workmen?—They will not bear it; and when they are pressed in that way, they leave the trade. A man cannot get a living under such inspection as they have had since 1851; and I should say, that if the parties governing that inspection had been determined to annihilate the trade, they could not have gone to work in a more effectual manner.

5843. The natural effect of that is, to cause the men to ask a higher price for the work than they would under a fair regulation, is it not?—A very much higher price. A man would be better satisfied with 25 *s.* a week, regular employment, than he would with my uncertain employment, with 35 *s.* and the vexatious inspection.

5844. Supposing that there is any difficulty in those views, have you not an appeal to the inspector?—Yes, we always have him to appeal to.

5845. Do you get redress from him?—We have not much cause to complain ourselves. I have heard of complaints.

5846. Have you had occasion to refer to the Board?—Yes.

5847. What redress did you get there?—We have always had our differences settled. I have known people applying to the Board, and then getting referred back to the inspector.

5848. Then the inspector becomes the master?—Yes.

5849. What plan should you recommend, instead of that?—An appeal beyond the inspector.

5850. What sort of appeal?—To a practical man; to any respectable practical gunmaker, or two or three of them, if necessary.

5851. What difference would it make in the supply of arms, whether the view was merely sufficient and usefully so, or whether it was vexatious?—The difference would be very great.

5852. In the quantity produced?—Very great; it would be very great indeed.

5853. Have you any notion that the Government can make arms any cheaper than the trade can make them, with the same view that they have had?—If the Government viewed their own materials as strictly as they have been viewing the contractors for the last two years, they could not make them cheaper than the contractors.

5854. You do not see any reason why they should?—They could not do it; they could not get workmen to work for them with such inspection.

5855. If

5855. If the view was reasonable, would it tend to make any reduction in the price of the gun?—Yes.

5856. How much?—I do not know exactly.

5857. Do you think that the article would be quite as good, quite as durable in its wear, and in every respect as good an article for use, if it were made at a cheaper rate?—A musket made with a fair inspection, such as I have been speaking of, may be made much cheaper than the present arm, and wear quite as long, and be quite as serviceable.

5858. That is merely an opinion, of course?—It is a fact.

5859. Do you think that the line musket, that was made before this extraordinary view, was as efficient and useful as the present rifle?—The line musket was viewed in about the same manner as the present one.

5860. There was not an extra severity in consequence of the rifling, was there?—No; it was in consequence, I think, of the alteration in the system of tendering for the supply of arms. The line musket was made under Mr. Lovell's superintendence and decision, and the prices that were to be paid to the workmen, and the profit to the contractor; the matter was left entirely in Mr. Lovell's hands. We had nothing to do with it; he appointed the prices to be paid by the contractors, and the price that we should charge to the Board of Ordnance.

5861. He appointed everything, including the view?—Yes; that was up to 1850. I think that then the trade was thrown open, and that made a very great reduction in the price, because then we had to fix our own profits, and we were satisfied with much less than we had before; but we had a much greater quantity; we had a very small quantity to set up before that time, at, of course, a high profit.

5862. Had you anything to do with the artillery carbines?—Yes.

5863. What?—The setting up.

5864. For setting up, how many did you undertake?—There were 2,000 divided between four of us.

5865. You took a share, did you not?—Yes.

5866. When did you get your order?—I forget when we had the order; I think it was in October.

5867. Last October?—Yes.

5868. Are they finished yet?—No; we have proceeded with them as far as we could.

5869. What was the reason that you could not complete them in less time?—we have not had the materials to make them with.

5870. How soon could you complete your share of such carbines if you had such an order given you, and the materials supplied?—I remember Sir Thomas Hastings speaking of the great delay that there had been with those carbines, and I told him that I would undertake a similar order in four months at the outside, and very likely I should execute it in three.

5871. Mr. *Newdegate.*] How long has that order been in hand?—Twelve months, within a few days.

5872. You are confident that if you had to complete the arm yourself, you would have done it in four months?—Yes, I am confident of it, and very likely in three.

5873. Mr. *Muntz.*] Had you the order last April?—I believe that the barrels were ordered then, but we did not have our setting-up order till October, I believe. I believe that there was a sufficient number of barrels delivered into store to enable us to proceed with the setting-up as early as June, but we did not receive them till the 7th of November.

5874. What was the cause of that?—The usual neglect in their method of doing business in the Ordnance rooms.

5875. Those carbines were urgently wanted, were they not?—Sir Thomas Hastings told me so, but I did not think so from the way in which they proceeded with them.

5876. What quantity were you to deliver?—We were to deliver them in six weeks from the delivery of the materials to us.

5877. Have you delivered all yours yet?—No; we have not had the whole of the materials yet, although the order, I believe, has been in hand nearly 12 months. Those are the carbines that the Chancellor of the Exchequer said we had

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had had in hand ever since April, and had not delivered them, though the materials were not delivered to us to make them.

5878. Have you received all the materials now?—No; at least I believe not up to last night.

5879. Have you any other contracts with the Board besides?—Yes, we have the 1853 order; and we have a contract or two that we entered into in October last.

5880. What were those?—There was an order for several things, for carbines and double carbines, and some pistols; one contract was for 3,000 pistols, which we entered into last October.

5881. Are those done?—They have not been delivered to us yet.

5882. Have you had a pattern?—No; we never have a pattern.

5883. Is there no pattern ready to be inspected?—They are similar to what we have made before; we have not received any materials for that contract at present.

5884. Do you know whether any of the barrels that you want are in store now?—They were all in store in October, I know that; but we have not had the barrels yet.

5885. What is the reason assigned for the delay?—I cannot say; I know of no reason.

5886. Are you sure that they were in store last October?—Yes.

5887. Are they there now?—We have not received them, consequently they must be there now.

5888. Mr. *Monsell.*] Are the rest of the materials ready?—I believe so.

5889. Then why are they not delivered?—I cannot say.

5890. Mr. *Muntz.*] Supposing that you had had those barrels, could you have gone on with your work?—If they had been delivered to us in October, the pistols would have been delivered into store long ago in a finished state.

5891. You did not cause the delay?—No.

5892. Mr. *Monsell.*] You have stated that the barrels, and the whole of the materials, are in the hands of the Ordnance, and that the barrels were in their hands in the month of October?—I did not state that. I know that the barrels were in store in October last, and I believe the materials were, but I should not like to say that positively.

5893. You do not know whether the materials were in the hands of the Ordnance?—I do not know of any orders for that description of materials being out; and if they are not in hand, I should say that they cannot be ordered.

5894. Mr. *Muntz.*] Do you think that if the guns were ordered as a complete arm, the Board of Ordnance could obtain their supplies better?—Yes, I think they would.

5895. Should you propose to have them viewed as Mr. Swinburne did?—Exactly the same as they are viewed now; that would not be altered at all; there would only be a change in the method of ordering the arms; they would be ordered from one contractor, instead of from many.

5896. Mr. *Geach.*] That is, you would order the parts, and take care that they were sent in, and viewed, and got out again as quickly as possible; and if you could not get one man to do it, you would get another?—Yes.

5897. You would be continually looking after them, would you not, to see that those things that were ordered were duly executed and sent in?—Yes, that is what we should do; there is plenty of power to get any quantity of materials required.

5898. As it stands now, you cannot communicate with the makers of the barrels, or the makers of the locks; you have to wait till they appear from the Ordnance?—Yes, that is so; we have no business to interfere in the matter.

5899. In the other case you would interfere, and if you found that you were without locks or barrels, you would be looking after people to get them made?—Yes.

5900. That would not prevent their being taken to the Ordnance, and being inspected, and given out as they are now?—I should recommend their being inspected exactly as they are now.

5901. Do you know why those things are kept so long in the Ordnance Department?—I have no idea. I do not interfere with the Tower at all. I only know that they are there.

5902. There is no reason why they should not be inspected and sent out in a much

much quicker time than they are?—I think that they are waiting for some portion of machine work to be done, which is not done so quickly as it ought to be, and consequently our men are put to great inconvenience.

5903. Mr. *Muntz.*] If that work were done by each individual contractor, it would be done in less time?—We should set about it the very day that we received the barrels from the store. If a barrel-maker had his barrels viewed one day, we should be at work on them the next.

5904. Were you ever told, that in case the guns could not be obtained, the Board of Ordnance would go to America for them?—I was told that they would be obliged to go either to Belgium or America.

5905. How long was that ago?—About six or eight months since, I should say.

5906. Colonel *Boldero.*] Are you aware that the Board of Ordnance have, on various occasions during the last 10 or 12 years, sent down to Birmingham some of their officers to enter into contracts with the Birmingham people for the supply of arms, and they have returned failing in their efforts?—No, I was not aware of that; no application of the kind was made to me.

5907. Have you ever attended a meeting of the trade, to make arrangements with such officers at Birmingham for the supply of arms?—With Mr. Lovell we have.

5908. Have you not separated without agreeing upon terms?—I do not remember any instance.

5909. Mr. *Newdegate.*] Have you seen the Belgium musket that was produced in this committee-room?—I saw it here yesterday.

5910. Have you examined it?—So far as I could in the room; it is necessary to take it all to pieces at a workman's bench before one can judge of it.

5911. So far as you are able to form an opinion, is it your opinion that that musket can be produced cheaper than the pattern of 1853 required by the Ordnance?—Considerably cheaper.

5912. What is the difference of price at which the two can be produced?—I think Mr. Swinburne said that he should not object to take an order at 36 *s.* or 37 *s.*, and I should be pleased to join him in that price.

5913. Does your opinion confirm Mr. Swinburne's opinion in that particular?—Yes.

5914. The price of the present pattern is 3 *l.* 9 *s.*, is it not?—Yes, I have heard that it is so.

5915. Colonel *Dunne.*] You stated that an alteration in the view took place when the tenders were thrown open?—Yes.

5916. Was not the consequence of throwing open those tenders to make the prices lower?—Yes.

5917. Do not you think that the inspector was justified in making a stricter view when there was a change of that kind, and when he might naturally expect that the smaller profit would lead to their not working up to the pattern?—No, I do not think that there is a pattern to work to; the articles are worked up the same as they were many years previously. I cannot account for the rejections rising from 10 per cent. to 50 per cent.

5918. Were they ever rejected when they were up to the pattern?—I have heard of articles being rejected one day, and received the next, without any alteration being made to them.

5919. Do you state generally that the work done in Birmingham in the various branches of the trade that supply materials for muskets is up to the pattern?—I do not think that they are passed without they are up to the standard of view; as to being up to the pattern, that I think is very doubtful, for the patterns are generally made regardless of expense; I do not consider the pattern a fair pattern at all to show the standard of view.

5920. What do you call the standard of view, is not that matter of opinion?—Yes.

5921. Therefore the opinion is merely between the man who makes the materials, and the viewer who is employed under Government?—Yes.

5922. Therefore there is no actual standard by which the work can be judged?—You may have a fair pattern placed before you, and a judge of the work will tell you which is equal to the pattern and which is not; now I believe that I could place before a Board of Military Officers a gun lock that should cost me 10 *s.*, and I would place another that would only cost 4 *s.*, and one lock should jig equally

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equally with the other, and gauge with the other in every respect, and they should not be able to tell me which was the 4*s.* lock, and which the 10*s.* lock.

5923. The question had reference to the viewers; if they require a piece of work from a contractor to be perfectly equal to the contract, are they doing more than their duty?—No, I should say not; but then we are liable to the whims and caprices of the viewer, and as it is only opinion that the man views on, it may be his opinion that it ought not to pass.

5924. Still you quite admit that the standard of view is bringing it up equal to the pattern, do you not?—If a man has a lock placed before him that is worth a guinea, and that man supplies an article only worth 8*s.*, that is not equal to pattern; but if it is understood at the time that the lock is put before the contractor, that what is required is a lock equal to a certain number of arms that had been supplied many years before, although that pattern is before you, we understand perfectly well what is required, and then we send in a lock, or a barrel, or gun, equal to what we consider the standard of view, regardless of the pattern.

5925. Your standard of view is, in fact, an imaginary standard, is it not?—Yes, it is, but it ought not to be so. I should like to have a pattern supplied with every contract, and to work strictly to it; that is the proper method of doing business.

5926. In fact, both on the part of the Ordnance, and on the part of the contractor, the pattern is supposed to be nothing more than a thing that you are to work to as near as the viewer approves of?—Yes.

5927. You disapprove of that, do you not?—Yes. We made an offer to the Board, that we would undertake an order if we might supply 20 patterns; 10 to be retained by the trade, and 10 by the Board of Ordnance, and by that means we should be able to settle many disputes that we now get into. I believe it is understood that there is only one lock made as a pattern, and only one bayonet, and I have inquired the reason of it; they say, "Because it is impossible to make two patterns alike." Why not? "Because there may be some trifling difference in making them; we will only allow you to have one pattern;" and that enables the inspectors to do just what they please with the manufacturers. The fair way to deal with a man is to give each contractor a pattern, and have a duplicate in the possession of the Board of Ordnance, and one with the inspector.

5928. Would you suggest, when there were several contractors, that a pattern should be given to each, which would compare as nearly as possible with the one in the possession of the Board of Ordnance?—Yes; if there were 100 contractors, 100 patterns; if only one contractor, only one pattern; that is, one in the possession of the contractor, and a duplicate in the possession of the Board, and a duplicate in the possession of the inspector; so that there would be one pattern left in the hands of the Ordnance, another in the inspector's hands, and another in the contractor's hands.

5929. It should not be made a higher standard than was actually wanted?—Certainly not, on any account.

5930. Mr. *Geach.*] You stated, did you not, that work equally as good made under the open contract system, was rejected, where the same work was received before that system was adopted?—The rejections rose from 10 per cent. to 70.

5931. Immediately after the trade had been thrown open?—Yes, and many men left the trade; and many others that would have contracted, were so disgusted, that they would not have any thing to do with the Ordnance work. Mr. Brazier, a lockmaker, I know has not done anything for the Ordnance for some time, on account of the rigid inspection between 1849 and 1853.

5932. The same men who were contractors under the old system, and who did work under the new system, had their work rejected to a larger extent immediately?—Yes, exactly the same workmen.

5933. Mr. Lovell was the inspector under the old system, and he continued so under the new system?—Mr. Lovell has been under both systems up to the last month.

5934. Mr. *Newdegate.*] Is not your object in saying that there should be a number of patterns this: that then the actual standard would be the average quality among those?—Yes, there would be a standard established then; I should prefer

prefer having, if possible, 100 guns as patterns, if only to establish a proper standard or quality.

5935. The standard would then consist in the average quality of the patterns?—Certainly.

5936. You would think it perfectly possible to produce a number of muskets up to that average standard, although it might be impossible to produce a *fac simile* of one pattern?—Certainly.

5937. Mr. *Muntz.*] It has been stated in evidence to this Committee, that there is no machinery hardly now used in gun-making; can you tell the Committee to what extent machinery is used in gun-making in Birmingham?—Since this Committee has been sitting, and since that was stated, I have taken some trouble to ascertain the number of horse-power in machinery steam-power used in Birmingham, and I find that it is a very high amount. I take the present contractors who work for the Board of Ordnance only in Birmingham, and the number of horse-power that they employ is nearly 600, without saying a word about the other manufacturers.

5938. Can you tell the Committee at what you estimate the whole of the machinery employed at Birmingham?—I should say upwards of 2,000 in the gun trade only.

5939. Which might be made applicable to the general trade?—Yes.

5940. Colonel *Lindsay.*] How long is it since you complained of the system of view; has it been going on for several years?—Since we have commenced tendering for supplies.

5941. When did you begin?—I think in 1850.

5942. Before that, you had no cause to complain, had you?—No cause at all.

5943. Mr. *Monsell.*] You stated, did you not, that if you were now to get a large order, you could get a good many men back again into the trade?—Yes.

5944. And you stated that the terms on which you would be able to get them back, would be by securing them employment for three years?—That is what I should wish to do.

5945. Assume the Government orders necessarily to be intermittent, and supposing they required 10,000 one year, 30,000 another, and 50,000 another year, still there would be considerable difficulty, would there not, in getting men in the way you have described?—We have sufficient men for those small quantities; but if you wanted 100,000 one year, and none another, and then took them up in two years afterwards, there would be a difficulty in increasing the number suddenly.

5946. Suppose that you required to get a number of workmen together sufficient to make 60,000 this year, and you were not sure that you would have an order for more than 10,000 the next year, you would find considerable difficulty, according to the statement that you have made, in getting the workmen together now?—If we were sure of 50,000 this year, and 10,000 perhaps the year following, there would not be the difficulty; the difficulty would not be so great if we were sure of 10,000 next year; but under the present system we have perhaps 15,000 or 20,000 this year, and no more for two or three years.

5947. Therefore the difficulty would exist to a great extent if the orders of the Government were intermittent?—Not to the extent that the honourable Member imagines.

5948. You could not secure to any man employment for three years if you were not sure of the work?—We should make arrangements; and we could make a better arrangement with the men if we were sure of two years' work than if sure of only one.

5949. Mr. *Geach.*] You stated that the men were very averse to coming into this trade; that is because the trade has always been an intermittent trade, is it not?—We had no difficulty up to the year 1850, when we had work regularly. Since then, we have been, as I stated before, perhaps 15 months without work.

5950. It is because of the uncertainty of the trade that you would find a difficulty in getting the men back into the trade, without giving them some security?—Yes.

5951. If the trade became regular, you would not have any difficulty, and the men would not require an engagement for time; they would rely upon that trade being good, as well as any other trade?—We have deceived them so often with promises, that I no not think that we could get them back without making a

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three years' engagement in the first instance, and then I consider they would remain with us.

5952. Suppose the trade to go on regularly for three or four years, you would not have any difficulty then in keeping the men?—No; we have no difficulty in our fowling-piece trade. A man at work there will be found to have two or three of his sons at work under him, or two or three apprentices; but if you go to the military trade, they will not bring their children up to that; they will put them out to any other trade that they think more certain.

5953. Mr. *Newdegate.*] The demand of the Ordnance has been more uncertain, has it not, since 1851, than you remember it ever to have been before?—Yes.

5954. It has been more uncertain and more irregular, has it not?—Yes.

5955. Colonel *Dunne.*] From what you know of the country, as well as of the trade, do you think it possible for the Board of Ordnance to issue those regular orders which you think so desirable?—I cannot see any difficulty, because in the present instance they say that they want 900,000 stand of arms, and 30,000 every year afterwards; and we had no promise of that till within the last month or six weeks.

5956. Has the Ordnance held out that hope, or do they apprehend that they will want that quantity?—That has been stated in Committee.

5957. Mr. *Muntz.*] Do you know what Mr. Lovell's view was with regard to the tender system?—I should say that he was decidedly opposed to it.

5958. Did he tell you so?—No; but it was in direct opposition to his notions of things altogether.

5959. Did you ever hear what was the cause of the increased strictness of the view?—It was generally believed that it was in consequence of the trade being thrown open, and a determination, whether on Mr. Lovell's part I cannot say, but on the part of some one, not to allow the trade to proceed on that principle.

5960. Colonel *Dunne.*] It could not have been on the part of the Board?—I cannot say on whose part it was.

5961. Mr. *Geach.*] Mr. Lovell predicted that it would not answer, did he not?—I have heard so, and it did not answer.

5962. Mr. Lovell was the person upon whose report it would be made to answer or not?—Certainly. If I were inspector of small arms, I could make the view so rigid that you could not get 10 guns out of 100 passed.

Jovis, 30° die Martii, 1854.

MEMBERS PRESENT.

Lord Seymour.	Lord Paget.
Colonel Boldero.	Mr. Monsell.
Mr. Muntz.	Mr. Newdegate.
Colonel Dunne.	Mr. Geach.
Mr. G. Dundas.	

WILLIAM MONSELL, Esq., IN THE CHAIR.

Mr. *John Barnett*, called in; and Examined.

Mr. *J. Barnett.*

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5963. Lord *Seymour.*] YOU have been engaged in the gun trade in London for some time?—I have.

5964. How long have you been engaged in the trade?—I have been brought up to and engaged in the trade all my life, about 21 years, but I represent a firm which has been established 100 years in London.

5965. What is your exact trade?—Gunmakers, we call ourselves.

5966. Have you a manufactory of your own?—Yes.

5967. Can you state what number of persons you employ?—At the present time I have about 150 workmen engaged.

5968. What has been the general nature of your business?—For the last two years and a half or three years, I have been compelled to depend upon orders from

from merchants and from foreign parts; but I have been a contractor for the Honourable Board of Ordnance, and my family before me, since 1794, and also for the East India Company.

5969. Of late years, what has your business consisted of?—For the last three years I have been entirely dependent upon foreign orders and merchants' orders in London and in England.

5970. Orders from foreign Governments?—Yes; I have made for several foreign Governments.

5971. You stated that you formerly made for the Board of Ordnance?—Since 1794 we have been contractors for the Board.

5972. Can you state when you last did anything for the Board of Ordnance?—I think in 1849; I think we completed our last contract in that year.

5973. Since then, have you tendered, or communicated to the Board of Ordnance your wish to tender?—I have made repeated applications to the Board of Ordnance, both personally and by letter. I had an interview with the Board in the spring of 1852. Hearing that the Board were about to issue a large quantity of extra-service muskets, I went up on behalf of the London trade to ask them to give a portion to London. I represented that the trade of London and the workmen of London were in a very distressed state; many of them were walking about, and many were leaving the trade; and I begged that the Board would give a portion to London, and I offered to take them at a price which I afterwards found was lower than they issued them to Birmingham for.

5974. Did you make that offer in writing?—No, I did not.

5975. You only made that offer verbally?—I made that offer; I think Colonel Dunne was then there, but I am not quite sure about that.

5976. *Chairman.*] Did you see Sir Thomas Hastings?—I did.

5977. Lord *Seymour.*] What was the date of that communication which you had with the Ordnance?—It was in the early part of the summer of 1852. I have not retained any memorandum of it; nothing came of it, therefore I cannot give the exact date. I have a perfect recollection of the whole circumstance, so far as begging for work, represented the depressed state of the London trade and the number of workmen capable of doing the work; and I said, "So anxious are the gunmakers of London to preserve a portion of the Ordnance work, that we will take them at such a price," which I afterwards found was some few pence less than they were given to Birmingham for.

5978. Had you completed your last order for the Ordnance in 1849 within the time?—Yes. I do not think that there have been any complaints against the London trade for the non-completion of contracts.

5979. Have you done work for the East India Company?—Yes, we have been contractors for them for a longer period than for the Board of Ordnance. Perhaps I may speak on behalf of the London trade. I will put in a statement of what the London trade has done for the East India Company during 10 years, commencing in 1841 and ending in 1850; but I will just mention that the total number of guns supplied and set up for the East India Company and Board of Ordnance in London, from 1841 to 1850, was 584,376.

5980. When you say "supplied and set up," will you explain what you mean by "supplied"?—The East India Company have been in the habit of employing contractors in the same way that the Honourable Board of Ordnance have, and their custom has been to provide barrels, locks, bayonets, and rods for the contractors, the contractors finding all the smaller materials and the timber; that is, for the muskets for the Line only; when they have orders for other descriptions of arms, they then give the whole to the gunmaker or the contractor, who supplies the arm complete. During those 10 years we supplied complete 105,238.

5981. It was a contract for the complete arm?—Yes.

5982. Did you ever offer to the Ordnance to take a contract for the complete arm?—I do not recollect ever making a direct offer, under the belief that the Board would not accept it, but we should have been very glad; we should not have found any difficulty in making that offer.

5983. Did you stock those muskets for the East India Company?—Yes; we set them up complete, and deliver them in fit for service.

5984. Then that necessitates your keeping a large store of stocks, does it not?—We have a large store of timber in London. I have myself, I suppose, something like 70,000 or 80,000 musket stocks.

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5985. Since 1850, the London gunmakers have had no order to execute, have they?—There has been no Ordnance work since 1850 set up in London. We have made further applications. I have already said that I made a personal application, but repeated applications have been made by letter. I waited on the Board in January last with two other gunmakers, believing that the Board must be in want of arms, looking at the state of the world; and we renewed the application, and reminded them of their promise that we should have work, and we begged that something might be given to the trade.

5986. If the Board of Ordnance could not obtain all their materials from the contractors, how do you expect that you would be in a better situation to obtain materials from the contractors?—Speaking from my own experience, I have never had any difficulty. I have set up a large quantity of arms, something like 25,000 a year, and I have never had any difficulty in getting materials either of the common sort, or of a superior description.

5987. You stated, did you not, that you supplied 105,000 complete arms for the East India Company?—Yes.

5988. Those were subject to view by the East India Company, were they not?—To the regular course of inspection, which is very similar to the course that the Board of Ordnance subject their arms to.

5989. Do they take the arm to pieces and examine its several parts?—They viewed the barrels, locks, and bayonets, if there were bayonets; every part was subjected to inspection, previously to being set up. For instance, the barrels were sent in by us to the East India Company before proof, and they received those that they thought proper to receive, and we then sent them to proof, and commenced setting them up if they stood the proof, and they were subjected to a view after proof, the same in every respect as the course of inspection that the Board of Ordnance think necessary.

5990. Can you state with regard to that number of 105,000, what proportion you had rejected in the view?—I could not speak from memory; but the proportion of barrels, I think, varies from 15 to 25 per cent. of rejections before and after proof; there are very few that burst in the proof.

5991. Were many of your locks rejected?—They vary. I should say about 10 to 15 per cent. of locks, those were the principal rejections of materials. As to the rods, we have seldom had them rejected; it is a simple process of manufacture, and they are very easily procured; we never had any difficulty in providing ramrods.

5992. You obtained your barrels from Birmingham, did you not?—Yes.

5993. And the locks?—Not altogether. There were (I speak of five or six years ago) several lockmakers in London, and we got them wherever we thought the supply was the best, and the work the best; we were guided by circumstances; the bulk of them we got from Birmingham.

5994. Have the number of skilled workmen in your trade diminished?—I think that the workmen still exist, although they may not be now employed in the gun trade. From my own experience, I should say that there are a great number of skilled workmen now employed in various other trades in London; there are many gun-stockers at work at carpentering, they get comparatively high wages in that trade; there has been no inducement whatever in London to remain in the gun trade, but I think that the number must exist to a very great extent, of the men who set up those arms in 1849, because it is comparatively a short time ago. I know from my experience, from the applications which I have weekly for work from men, that a large number do exist.

5995. But the employment of skilled workmen in London is much diminished apparently?—Yes, since the Board took all the work away, and the East India Company for the last two years have not given out any orders; that has also been a cause of distress to the workmen; but my impression is, that they still exist in London or the neighbourhood.

5996. Then the foreign trade does not supply employment enough for the London men?—Certainly not.

5997. How is it that the London men with the foreign trade cannot compete with the people of Birmingham?—Speaking from my own experience, I find that I am able to compete with Birmingham and the rest of the world in the supply of arms; but there are not many gun-makers of my own class existing in London; only three or four.

5998. It has been stated to this Committee that the number of skilled workmen in the country was about 4,000?—I heard that stated, but I differ from that; I think that was an erroneous statement.

5999. Do you consider it too many or too few?—Too few; it would have been quite impossible to have got up the number of arms that we did in 1849 and 1850 if that were correct. I believe that those men still exist. I know at the present moment, from the number of arms being made in Birmingham and London, that it must be erroneous. The number of arms made in this country has not diminished in the last three or four years, although the Board of Ordnance have not made any great number. I believe that the export trade of this country is increasing, so far as the experience of my own establishment goes.

6000. Have you any machinery in your establishment?—Not to any extent. I have a small steam-engine for polishing locks, but I have never been able to see any advantage that might be derived from the use of machinery. I should be quite ready to put up machinery to any extent if I could see any economy in the use of it, but I should like very much to see those machines at work that have been spoken of.

6001. Have you ever visited any of the foreign manufactories?—I have been a great deal in Liege.

6002. Did you find that they had nothing there that you could introduce into this country with advantage?—Nothing in the way of machinery. With regard to Liege, I have heard several statements made here, and if the Committee will allow me, I will just state my own experience as regards the Liege gun-makers. I have been injured exceedingly by their conduct for the last three or four years, and I am now engaged in a law-suit with several of the Liege manufacturers for counterfeiting my name. My arms go into competition with theirs in various foreign parts, and they have adopted a system of forgery, or taking my name, address, and trade marks, and putting them on their own spurious imitations to a very large extent.

6003. You have a law-suit now pending in Belgium on that account?—Yes. If their manufacture is so much superior to ours, it is a very singular thing that they should be compelled to adopt such means as that to insure the sale of their arms. I have letters from foreign countries complaining of this practice, stating how injurious it is, not only to me, but also to the merchants who purchase my goods. With regard to the machinery in use at Liege, I was there about three weeks since on this law business, and I asked two large manufacturers there whether they had ever seen this machinery at work; and they said, "Oh, yes, we have it in our Royal Manufactory." I spoke of the machine that has been so much spoken of, the machine for stocking guns: "It has been at work about two years, but it is put on one side as not producing work equal in quality to the requirements of the government." I have a letter here which explains that from one of those gentlemen. When I returned, finding that such evidence might be useful, I wrote, and my friend confirmed it, and repeated it in writing, that it was not capable of producing a gun equal to the requirements of the service; that is, as to the stocking of it.

6004. You have spoken of the machinery at Liege which did not answer; are you acquainted with the machinery that is used at Springfield, in America?—No, I am not. At Liege they will not show the machinery to any stranger; it is tied up in sail-cloth, and kept as a curiosity, I believe.

6005. Have you ever seen the government musket that is made in America?—Not of late years; I have seen the flint musket that was produced in America in 1830, but the comparison would not be a fair one.

6006. You have spoken of your large supply of wood for stocking; do you get any American walnut for that purpose?—It has been introduced into this country, and offered to the Board of Ordnance and the East India Company; but the viewers have invariably rejected it as being inferior. There is no doubt that it is an inferior wood to the English and the European walnut; it is an open-grained wood, and quite a different texture of wood.

6007. It can be obtained at a lower price, can it not?—Considerably.

6008. Do you chiefly purchase English walnut?—Yes, and Belgian.

6009. Have you ever any difficulty with your workmen?—I have not had anything to complain of for some years.

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6010. When you last had a number of workmen in your employment, had you any difficulty with them?—There have been one or two disputes, but I think that was very much caused by the printed lists that were circulated by the inspector of small arms; those lists were issued to the trade, and within a very short time they were altered, and I think we may attribute the disputes in a great measure to that cause; the men were dissatisfied at seeing lists printed and then departed from within a very few months, and reductions made which caused a very unpleasant feeling. We never had any strikes of long continuance, and they were generally got over either by our yielding to them or their giving way to us. For some time there have not been any strikes in London.

6011. Do you remember the price that you paid your workmen, compared with the price at Enfield?—My impression is (I have no data) that we always paid the same price. I think that was one great cause of the high price paid for the work; we were compelled to offer them the same price; we could not offer them a lower price; 1,000 arms, perhaps, having been set up at Enfield, that in a measure fixed the price for the trade. The men at Enfield have many advantages which the workmen in the general trade have not; they have constant work, and pensions for long service, none of which advantages we can offer in the general trade. The men know very well what is paid to the Enfield workmen, and the price is fixed; I think it is a very bad precedent. At Enfield before the work is given out to us, the Board have generally set up a quantity of arms there, and it becomes known; a high price is fixed, which it is impossible to alter.

6012. You think that the fixed price in the Government manufactory tends to enhance the price for the trade generally?—I think that it has had that effect; and I think it must have that effect.

6013. If the Ordnance were to offer you a contract for the entire musket complete, should you be ready to take such a contract as that?—To a certain extent, I think we should.

6014. Do you think that the London trade would?—I think they would.

6015. When you say, "to a certain extent," will you explain what you mean?—I think that there are members of the London trade who would undertake such a contract for the Board.

6016. Are the Committee to understand that you would not be prepared yourself?—Yes; I am quite prepared to do so myself, but I speak with caution on that subject; I am only one of the trade, but the applications which we have made to the Board, I think, show our wish and willingness to work for them. With regard to finding materials, if the Board wish to do so, or if they stipulate that we should do so, we should be prepared to supply them.

6017. Mr. *Newdegate.*] What were the lists that you refer to that were issued by the Government inspector?—Printed lists issued by Mr. Lovell, about the year 1843, I think, in which he stipulated that certain prices should be paid by all the contractors employed by the Board of Ordnance to the workmen, and those prices were pasted up in the Government view-rooms; and perhaps, in the following contract that was issued, those prices would be altered, which caused a great dissatisfaction among the journeymen. I have a perfect recollection of that circumstance.

6018. How long did that system continue?—I think that that system lasted till the work was thrown open to tender.

6019. Up to 1850?—I think so. I have a great number of those lists at home.

6020. Since that system was abandoned, you have not had any difficulty with your men?—I cannot speak as to that, not having had any Ordnance work to do since.

6021. You do not anticipate so much difficulty if that system is not renewed?—I think not.

6022. Mr. *Muntz.*] Is there sufficient skilled labour in London now to meet any requirement?—I think not.

6023. Do you think that you could obtain it from other different trades if you required it?—I have no doubt of it.

6024. Do you know how many people are now employed in the gun trade in London?—I have no exact knowledge; I should say that there is a considerable number of men. I have applications myself weekly for work, and I am unable

to

to give out work; getting up what orders I have, I am not able to give work out. I could get up a much larger quantity than I am doing, if I was able to give work to the applicants who come to me.

6025. Did you ever see that machinery for stocking guns in Belgium?—No.

6026. You merely heard that it was not employed, because it did not answer the purpose?—Yes.

6027. Did you make any comparison as to the cost of stocking by hand in Belgium and in this country?—Yes, and I think that the difference is in favour of Liege, in the price of labour, 15 or 20 per cent.

6028. With respect to the quality of the work, what is your opinion of it?—It was decidedly inferior; there is no doubt of that, I think.

6029. Do you find that in your trade they can compete with you successfully?—I find that my work is preferred at a considerably higher price.

6030. Do you export any guns to the United States?—Not to the United States; I do to North America; I supply the Hudson Bay Company with a large quantity of arms.

6031. Do they buy any in Liege?—No; the Belgians copy that gun, the English gun, and put my name on it; and the Belgians, to a very great extent, send them out to New York. That is one of the guns that I have an action pending now about; the gun sent to America.

6032. They put your name on it to give the gun a better character?—Yes; not only the name, but the address, and they imitate every mark; they are exceedingly clever in that.

6033. You have an action now pending in Belgium in consequence?—I have.

6034. Colonel *Dunne.*] You stated that the Ordnance refused to take the offer that you made for guns in 1852?—I did.

6035. Was not there a tender for contracts put out at the time?—There was not.

6036. The offer was made without any tender on your part, was it not?—The fact was this: we were without work in the spring of 1852, and hearing that a large quantity of extra service muskets was about to be given out to Birmingham, I made a personal application, fearing that there would not be time, to Sir Thomas Hastings, and the Board of Ordnance.

6037. Is it not the custom of the Board to put out tenders when they want arms, and are you not aware that they do not make private bargains with individuals?—That was the very cause why I made the application. We had had no tender sent to us, and we understood that no tenders had been sent to the Birmingham trade; therefore we thought that the work would be given away before we had an opportunity of applying.

6038. It was not given away before tenders were called for, was it?—I did not hear of any member of the trade, either in London or in Birmingham, who had a tender.

6039. Were there any contracts taken subsequently to your proposal in London or Birmingham?—About that time a large quantity of extra service muskets was given to Birmingham.

6040. Without tenders?—That I cannot say; I only say that no member of the London trade or the Birmingham trade had tenders sent to them, except four men who were at the moment at work for the Board.

6041. And they got these arms to finish?—The four men had the arms to set up.

6042. *Chairman.*] Were there no advertisements in the papers?—None whatever; it was merely by report that I heard that those arms were about to be given out, and being prepared to take them in London at a very low figure, I, having nothing to do at the time, made a personal application to the Board, fearing that if any delay took place the arms would be given out, and I believe they were given out when I made the application.

6043. Without public advertisement?—Yes, no doubt of it.

6044. Colonel *Dunne.*] Are you aware that those muskets were furnished by those who had a tender at that time from Government at a lower price than you offered?—No; my impression is, as I have stated, that I offered to do them for some pence less than they were given to the four Birmingham contractors for.

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6045. *Chairman.*] Do you recollect what you did offer?—I could not state the exact figure; but it was a great grievance with us in London, having stated the exact sum at which I offered to do them, to find that more was paid to the contractors who were setting them up. We would have taken them to get nothing, just to give the men a little employment.

6046. What class of arms did you supply in 1848 to the Ordnance?—In 1848 there were 5,888 line muskets set up in London, there were 1,841 artillery, and 103 rifles.

6047. Do you recollect when the order was given for the setting up of the line muskets?—I cannot speak as to that; we had a succession of work at that time, and many of the orders ran one into the other. I have a paper here with each description of arms set up for the Board of Ordnance from 1841 to 1850.

6048. I have before me a statement that London, in 1848, of the new line muskets ordered in 1845 and 1846, supplied 7,009?—That is quite a mistake. We were prepared then to set up many more than we had; the orders were doled out to us, and it is possible that the date of the Board's order might have been 1845, but we did not get the materials till perhaps 1848; there was no delay whatever in London at that time; we were going on with a regular supply every week.

6049. You state now that you have been very much dependent upon the foreign trade; in that trade you include the trade with our own North American colonies?—Yes.

6050. At what price do you supply the Hudson's Bay Company?—It is between 18*s.* and 22*s.*

6051. At what price do you supply the foreign orders?—They vary from 12*s.* up to 40*s.* and 50*s.*

6052. Are the great majority of those arms what you call low-class muskets?—We do not call a musket a low-class at 21*s.*; we supply a very good musket at 21*s.*

6053. Is 21*s.* about the average price at which you supply them?—Yes.

6054. Where do you get the materials from for supplying those orders?—Entirely from the material makers; I do not make any myself; I find it cheaper, as I believe it to be so, to buy them from the trade.

6055. Where do the material makers principally live?—Principally in Birmingham, and Wednesbury, and Staffordshire.

6056. You stated that there were several lock makers in London some years ago; do you know how many there are now?—I think there are only two or three now; the trade having left London, they were compelled to leave also.

6057. By the trade having left London, you mean the Government demands having left London?—Yes; to which they were principally, and almost exclusively confined.

6058. Did the Government demands form a large portion of the work?—Yes, and the East India Company's; the two demands going together, both for the same style of work.

6059. You have stated, have you not, that the London trade supplied the East India Company, in 10 years, with about 584,000 stand of arms?—Yes.

6060. Will you state what class of arms they were?—They were 95 per cent. of first-class muskets, rifles, sergeants' fusils. I have a list here, which I will put in, by which it will be seen that we supplied 56,638 sergeants' fusils, 8,054 cavalry carbines, 7,083 sappers' carbines, 13,219 rifles, and 17,751 cavalry pistols. Then comes the second-class arms: 1,137 sea-service pistols, 678 sea-service muskets, 108 blunderbusses, and 570 wall-pieces. These arms were supplied to the East India Company complete, and the materials found by the gun makers in 10 years.

6061. You spoke of your not having found any machinery that you approved of at Liege; did you see the rifling machines there?—Yes.

6062. What do you think of them?—I have not seen the one that I heard Colonel Gordon speak of, but some three or four years ago I saw one in M. Malherbe's manufactory, which was spoken of very highly to me, but I could not see anything at all in it superior to our own. I have one of Evans's rifling benches, and my comparison then was more favourable to my own plan. It is possible that within the last 12 months they may have got something, but I will venture

venture to say this, that if they have anything better we shall very soon have it in this country.

6063. Colonel *Boldero.*] Have you any idea what the annual export trade from the port of London is in small arms of all descriptions?—I have heard what the export of small arms is from the United Kingdom, but I cannot give any answer as to the export from London alone. I should say that it is divided between London and Liverpool, and perhaps a small portion from Bristol, about 300,000 to 350,000.

6064. You cannot separate them?—No.

6065. What is the producing power of London in the construction of muskets, supposing that the whole power combined to assist the Ordnance, what would be the annual number of muskets that you could turn out?—I have not the least hesitation in saying that we could do again now what we could in 1848 and 1849 with about six months' start; I have not the slightest difficulty in stating that. I should say that we could produce about 100,000 in a year with six months' start to organise the trade again; it is now disorganised.

6066. Mr. *Newdegate.*] From want of employment?—Yes.

6067. You stated, did you not, that there were only three lock makers in London; is it not the fact that they have gone down into the Midland counties?—No doubt of it; one man has emigrated to Australia, and the others have, I believe, gone down to Staffordshire.

6068. There is an advantage there in making materials, is there not, in the cost of the fuel and the iron?—Yes; no doubt, when the manufacture is entirely iron and steel, there is a great advantage in being on the spot.

6069. Your trade in London is that of setting up and completing the arm?—Precisely.

6070. Having here a command of skilled labour, you have facilities for carrying on that branch of the trade?—Yes.

6071. You have worked for the East India Company?—Yes; a great number of years.

6072. Have you had any reason to compare the advantages and facilities of working for the East India Company with the circumstances which have characterised the orders you have had to execute for the Ordnance during the last three years?—I could not help doing that.

6073. Have you found that the system of the East India Company is such as afforded you more facilities in supplying them?—Very much greater.

6074. It is principally attributable to the system of view, is it not?—The supply of materials was very much better. If we had an order to set up 1,000 stand of arms, we had the materials all ready, and if for 2,000 they were all ready; and having an opportunity of supplying the small materials ourselves, we never stood still when once an order was given; there was never any delay in going to work at once, and going right through with the manufacture. I never recollect an instance of any delay taking place from want of materials, with respect to the East India Company.

6075. Mr. *Muntz.*] Do they machine their own barrels, the same as the Board of Ordnance do?—No.

6076. Do you do it?—Yes.

6077. The work is not retarded by any delay occurring in the view rooms?—There is no delay; they are given out as soon as they are viewed.

6078. Mr. *Newdegate.*] You do more of the small work without the intervention of the officers of the Company?—We find screws, nails, and swivels, which we always have in stock, and which we have no difficulty in getting.

6079. The Ordnance, on the contrary, supply all those themselves?—Everything.

6080. You attribute a great part of the delay to the intervention of the Ordnance in the supply of those minor details?—I do.

6081. Colonel *Dunne.*] Do the East India Company view all those nails that you supply?—They view them when the gun goes in, not before; I will correct that answer. They view the spring for the bayonet, the rod spring, and the trigger before it is let into the gun; then they have an opportunity of viewing

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the nails and screws when the gun goes up in the screwed together state; those small things are not viewed before.

6082. Mr. *Newdegate.*] Altogether, the view of the East India Company, though effective, is not so vexatious as that of the Ordnance?—We have had no occasion to complain for some years past of that view; whenever any little complaint has been made it has always been remedied at once.

6083. Colonel *Dunne.*] How is it remedied?—We should apply to Colonel Bonner; but there is a gentleman of the name of Rothnay, the sub-inspector, and any little difficulty that may arise is at once adjusted on application to him. I never had occasion to apply to Colonel Bonner.

6084. *Chairman.*] Is the arm of the East India Company equal to the present Minié rifle?—No, I think it is not a fair comparison; the East India Company have not set up any arms since the Board of Ordnance set up the Minié rifle.

6085. The East India Company have had no experience of this superior gun?—No; but I consider that the rifles that we set up in 1847 for the East India Company were in every respect equal to the present Minié rifle.

6686. How many of them did you set up?—Thirteen thousand two hundred and nineteen.

6087. You have spoken about the producing power of London; I presume that you confine that remark to those parts of the musket that are made in London?—I stated that if any manufacturer in London of any character had an order for arms, he would have no difficulty whatever in supplying them.

6088. But he would have to get the materials from Birmingham, would he not?—Yes, the barrels, and other materials.

6089. You have spoken about strikes; do you consider that strikes in the gun trade have increased or decreased since 1849?—They have decreased very much in my own experience. I have heard of strikes at Birmingham, but I have no personal knowledge of what they were, or what the extent of them was; but I always heard that they were got over in a very short time. My own experience would lead me to say that the gun trade has been remarkably quiet compared with other trades. I never recollect any work being stopped in Birmingham for any length of time.

6090. Do you conceive that in Birmingham there have been fewer strikes since 1849 than before 1849?—Am I to understand the question as referring to the gun trade as a whole, or taking the material makers, or the setters-up alone?

6091. My question referred to the material makers and the others?—I think that, perhaps, there have been a number of strikes in Birmingham with the lock makers. I am not aware of any other branch that has been affected in that way, and the dispute with the setters-up for a short period, when the last contract was issued.

6092. Colonel *Boldero.*] Do you consider that the East India Company's musket, the smooth bore, is equal to the Ordnance smooth bore musket?—I do.

6093. Can you state what the last contract price was with the East India Company?—I cannot for the whole arm; but the price for setting up, providing the small materials, and the stock, was 26 *s.*

6094. Lord *Seymour.*] Can you state what was the largest number of arms that you ever set up in your own establishment in a year?—In my own recollection, 32,000; but during the last war we set up a very much larger number; that I cannot speak to.

[*The following Papers were delivered in:*]

ORDNANCE ESTIMATES.

PROPOSED PARLIAMENTARY GRANT of £. 100,000 for a SMALL ARMS MANUFACTORY.

ASSERTIONS having been made that the Gun Makers of this country are unable to meet the demand for Arms on the part of the Government, the following Table is appended, to show what was actually done in London alone during 10 Years.

TOTAL SUPPLY of ARMS made in *London* for the Government and East India Company, from 1841 to 1850.

DATE.	East India Company.	Government.	TOTAL.	
1841 - - -	20,150	7,660	27,810	
1842 - - -	36,353	12,926	49,279	
1843 - - -	34,880	12,270	47,150	
1844 - - -	25,362	13,496	38,858	Total of Ten Years, 584,376;
1845 - - - -	49,623	12,539	62,162	
1846 - - -	50,880	16,336	67,216	or an average of 58,437 for each year.
1847 - - -	57,214	18,378	75,592	
1848 - - -	55,068	23,862	78,930	
1849 - - -	71,381	26,366	97,747	
1850 - - -	26,025	13,607	39,632	
	426,936	157,440	584,376	—

This number is exclusive of supplies to Foreign Governments and private trade; in fact, the London manufacturers have never failed to do all that the Government and the East India Company have required of them.

Under a proper system of management, the productive power of London alone for Military Arms is 100,000 per annum; whilst the trade of Birmingham is capable of furnishing, with ease, a similar number.

ARMS Set Up in *London* for the Board of Ordnance in 10 Years.

Alt. Infantry.	Carbines.	Pistols.	Vic. Car.	Constab.	Sea.	Fusils.	Bk. Actn.	Line.	Flt. Guns.	Artillery.	Rifles.	
5,552	192	953	464	901	850	583	900	- -	200	- -	- -	10,395 in 184
7,752	92	529	453	46	2,035	1,084	909	70	- -	- -	- -	12,970 „ 184
420	429	619	- -	1,432	2,265	370	810	6,562	- -	241	12	13,160 „ 184
64	4,506	1,822	- -	1,296	- -	- -	54	2,277	- -	553	1,055	11,627 „ 184
Ex. Service.												
67	818	453	- -	- -	- -	- -	4	11,755	- -	756	200	14,053 „ 184
9,260	26	4,841	- -	- -	- -	- -	- -	5,703	- -	180	341	20,351 „ 184
266	- - -	849	- -	1,838	- -	- -	- -	11,645	- -	1,529	2,023	18,150 „ 184
	Serj. Carbines.											
12,578	3,373	- -	- -	- -	- -	150	- -	5,888	- -	1,841	163	23,933 „ 184
8,977	851	4,851	- -	- -	- -	- -	- -	11,319	- -	80	- -	26,078 „ 184
7,866	- - -	126	- -	70	- -	- -	- -	4,919	- -	- -	- -	12,981 „ 185
52,802	10,287	15,043	717	5,583	5,150	2,187	2,677	60,138	200	5,180	3.734	—

Mr. *David William Witton*, called in; and Examined.

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6095. Lord *Seymour.*] YOU are a military gunmaker, are you not?—Yes, I am.

6096. How long have you been in the trade?—I have been connected with the trade for very nearly 40 years.

6097. Is yours an establishment for the setting up of guns?—For the setting up of arms complete.

6098. When you say "for the setting up of arms complete," have you often contracted with foreign Governments, or with any parties for setting up the arm complete?—Yes; I have contracted with several Governments; in the year 1830, the National Guard of France was supplied by London and Birmingham together, to a very large extent.

6099. Do you know what portion the trade of London supplied?—A very large proportion, I should think probably approaching to 100,000; in 1831 we had in London a large order for the Russian Government; in 1847 I supplied large quantities to the Portuguese; and in 1848 I had an order from the Danish Government.

6100. Was it a large order?—Yes, I think I got up something like 8,000 or 9,000 for the Danish Government at that time; in 1849 and in 1853 I had considerable orders for the Spanish Government; the whole of the Spanish war steamers are supplied with arms of a particular construction, and they are principally from London.

6101. In supplying those arms, you went to Birmingham, did you not, for the different materials?—To Birmingham and its neighbourhood; all the heavy materials are bought either for the Birmingham setters-up, or the London setters-up; the only difference is with reference to the carriage to London in the one case; but for the Governments that I have spoken of, and the last was the Peruvian, I got up 10,000 for them in 1852, and we got the whole of the materials complete. It is only with the English Government that there is an exception as to finding materials; for all private orders, and everything connected with the gun trade, with that exception, they are found; also for the East India Company partially. The gunmakers of London get up the whole of the gun complete; they procure the barrel and the lock from the country, and then complete the gun, and in that state they are examined by the proper parties representing the Governments they are exported for.

6102. What sort of view had you for the Peruvian Government, or the Portuguese Government?—For the Peruvian Government we had for examiner a party who is well connected with the Company, and who in his overtime inspects those arms, and marks them.

6103. Is he a practical gunmaker?—Decidedly; he is a regular viewer.

6104. What proportion have you had rejected of any of those you supplied?—Comparatively few, because every gun goes though the hands of the foreman, the head of the establishment, previously, and there is a little pride about it that he should not have many returned on his hands, but that the thing shall be unquestionable. Again, as to foreign Governments, I never undertake an order to have anything of a view on the other side, therefore anything that takes place is final; many arms are ordered with a view to circumstances which change before the arms get out, consequently we have it all settled here.

6105. Have you also worked for the East India Company?—I have.

6106. When did you last work for them?—In 1851, I think.

6107. Was it a large order?—We take the orders out in proportions in the trade; each one has a proportion to do.

6108. Do the East India Company supply you with materials?—Yes, excepting small proportions; they supply the barrel, lock, and so on, and we find the stock and the small work; and it would be a very great advantage if the Government did the same, because the Government send out their small work; it is not worth while to go down and change them; it is better when we find them than to have them sent out, and it would be a great saving to the Government as to the trouble of keeping a stock. Here are 14 little things given out to the trade, whereas we have them on our premises, and supply them; it is a matter for the Government to determine.

6109. You consider that there would be economy in that system?—Decidedly; it

it would not be worth our while to send a man down to lose one or two days to get the things changed; it is better to find them ourselves, and give them to him.

6110. When did you last do any work for the Government?—I think it was in 1851.

6111. What was it for?—For the extra service; the last.

6112. Was it a large order?—I think my proportion was 3,500.

6113. You consider it an advantage, do you not, to have a Government order, because it enables you to keep on your hands?—That is the great advantage of a Government order; it keeps the staff up, and that is what we have been aiming at for a long time: not to give us work to embarrass any other parties, but merely something to keep a staff about us, that we may be ready for anything that may occur; not with a view to get away a great portion from Birmingham; we have no such desire.

6114. When I visited your establishment a little while ago, I saw there some Government rifles, I think?—Yes.

6115. How did it happen that you were making Government rifles if you had no orders for them?—Of the guns that I have on the premises now, probably 1,000 went away this morning to the Tower. I have no order from the Government, but I am quite aware that there are soldiers going away without arms. Mr. Lancaster applied to my late partner to ask him whether he would assist, and I, knowing the importance of it, was very glad. I have no gain out of it, but I have facilities, and I have thrown my place open to the Government, that they may have the advantage of it. The Tower had not shops fitted up with forges, as they are required, and therefore we have been able to assist. Mr. Lancaster, I think, has sent six men, and I have thrown my men open to him; I think they probably will have 1,400 guns in the service in consequence. I have nothing to do with that, no more than throwing my all into the way, and I was very glad of the opportunity I had of doing it. I have thrown my men open to Mr. Lancaster; he has 10, and he takes them as he likes, but the Government get their guns; had it not been for your Lordship seeing it, I should not have named the circumstance, and there we are open for any more if they come.

6116. *Chairman.*] Those are Government smooth bore rifles in your premises, are they not?—They are the regular pattern; we are resighting them; we have premises that are suitable, and I have thrown them open that Mr. Lancaster may have the men, so that the work shall be done. It is a very common observation, out of doors even, that the troops are going away without arms, and we should be hardly Englishmen not to do everything in our power to get them done.

6117. Have you, in the foreign trade in which you have been concerned, found much competition from the Belgian gunmakers?—No, I have not found anything of the sort; I do not fear the Belgians at all.

6118. Lord *Seymour.*] Have you written to the Board of Ordnance at any time, desiring to be employed, as was stated by the last witness?—I ask respectfully the permission of the Committee to read the applications and the answers.

6119. Will you give the date first?—The first is dated the 7th of January 1853. "To the Honourable the Board of Ordnance. The petition of the undersigned gun manufacturers of London, humbly showeth,—That your petitioners have been for many years engaged in the manufacture of military arms, and have for that purpose expended large sums of money in the erection of the necessary machinery in their respective factories. That your petitioners have been in the habit of employing a large number of experienced and able mechanics in the respective branches of the gun trade, in manufacturing for the service of your Honourable Board. That your petitioners deeply deplore having been deprived of the work it has been their privilege usually to set up for your Honourable Board, and cannot but view with alarm the impending destruction of the gun manufacture hitherto carried on in London. That, associated with this, will be the dispersion of some of the workmen to trades less useful to their country in time of need, and the distress of others (with their families) who may not be able to turn their hands to other employment. That, in order to avert these consequences, your petitioners are willing to undertake the setting up of small arms upon the same terms and conditions as those allowed to the masters in Birmingham. Your petitioners therefore humbly pray, that your Honourable Board will be pleased to preserve a very important portion of the gun trade to London, by allowing your petitioners the opportunity of undertaking a part of

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your Honourable Board's orders, and thus avert the serious consequences to the London masters and workmen which must otherwise inevitably follow. And your petitioners, as in duty bound, will every pray, &c." On the 31st of January following the application of the 7th, we received this reply: "Gentlemen,—The Master-general and Board of Ordnance having had before them your petition, dated 7th instant, forwarded by Lord John Russell on the 12th, praying that tenders for the setting up of small arms may be called for both in London and Birmingham, I am directed by the Master-general and Board to acquaint you, they have given orders in compliance with your request." From that time to this moment we have not received one gun or one tender from the Board of Ordnance.

6120. That would depend upon the quantity of materials that the Board of Ordnance had obtained, would it not, since that time?—We, as manufacturers, may take perhaps a view that may not be in accordance with the view of the Committee; but we consider, that when the Master-general and the Board of Ordnance say that they will send out tenders, and when we know that they have sent out those tenders, and that they have given orders without tenders even to Birmingham, I think that some materials must have been there; they could not have given them out without materials. There is no qualification in this letter.

6121. That application had no effect; did you make any other application?—On the 17th of October we sent an application to the Honourable the Board of Ordnance, in these words: "Honourable Sirs,—On the 7th January last the master gunmakers of London had the honour to address your Honourable Board by petition, praying to be employed in setting up small arms for the public service; and I now beg respectfully to annex the copy of the said petition, marked No. 1, with a copy of the reply, marked No. 2, which your Honourable Board was pleased to return to the master gunmakers in question. In consequence of its being stated, and generally believed, that your Honourable Board has given out orders for the supply of 21,000 sets of new materials for small arms, I am requested (being one of the master gunmakers of London) to express the hope of the masters in general that they may be favoured with a portion of the new order to set up, which will alike be of importance to the masters as well as their workmen on the one hand, and on the other it will be the means of preserving to the gun trade of London an important branch of national manufacture." That was on the 17th of October last.

6122. Had it any effect?—The reply to it was on the 31st of October 1853. "With reference to your letter dated the 17th instant, requesting, on behalf of the master gunmakers in London, to be allowed to furnish a portion of the 21,000 sets of new materials for small arms about to be set up for Ordnance service, I am directed to acquaint you, the Board cannot at present decide upon the measures which they may consider advisable for setting up the 21,000 muskets herein alluded to."

6123. That had no effect, had it?—No. The letter on the 12th of December is almost a repetition of it. The fact was, that there was an advertisement put out in the papers for the very things, the setting up of arms and things; we were supposing that it might be expected that we should notice it in the same way, and then it might be said, "Well, you should have seen it in the papers," because it was stated that persons who were upon the lists had no occasion to apply; but then came the question among ourselves, "Who is on the list, and who is not?" Therefore we applied to the Board, begging that the names of the whole of the parties in London might be put on the list. And then this letter, dated the 15th of December 1853, says, "With reference to your letter dated the 12th instant, requesting to have your names placed upon the Ordnance list of parties to be applied to for tenders for setting up small arms for service of this department, I have it in command to acquaint you, the Board have ordered that you be applied to for tenders for setting up small arms as occasion may require." By that means we merely put our names on the list, and the Board complied with our request. Finding that the Master-general and the Board, so far back, had made what we considered a contract, we were anxious to have an interview with the Board on the subject, to see if we could come to some understanding about it; and I wrote a letter on the 20th of January, this year, in these words: "I have the honour respectfully to solicit the favour of your Honourable Board permitting a deputation of London gunmakers to have

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an interview with your Honourable Board, for the purpose of explaining the past and present state of the gunmaking trade, and the masters will feel grateful for an early day being appointed; trusting your Honourable Board will please to grant this favour." I took the letter myself; I was requested to wait; and, after some little time the secretary, Mr. Wood, called me in, and said, "The Board will see you to-morrow; but unless you can say to-morrow they can fix no time." I very gladly took advantage of the time, and on the day following myself and two or three of the trade waited upon the Board, when we saw Mr. Monsell and Sir Thomas Hastings, and we went into a long statement, showing what we had done for the Board in all cases; Mr. Monsell kindly said, "That it was very interesting;" and after that time Sir Thomas Hastings spoke about the arms, and the great difficulty they had in getting them up; I said I did not know, but we could get up the arms. Then he made a remark as to whether we could do what the Government could not do; I said, "Certainly, there are many things which the masters will do, and we shall only be glad of an opportunity of doing them." He said, "You had better put those things in a statement, the Board would like to have them before them;" and the consequence was, that on the 26th of January I wrote a letter to this effect: "On the 21st instant, I had the honour to wait upon your Honourable Board as one of a deputation from the master gunmakers of London, for the purpose of offering some observations on the present state of the gun trade generally; of showing (in a national point of view) the great importance of the London branch of that trade to the country in all times of need, and further to implore that your Honourable Board would be pleased to accord some protection to that branch under its present depressed condition. From the commencement of the war with France in 1793, to the peace of Amiens in 1802, and again from the renewal of hostilities in 1803 to the peace in 1815, the Government required large supplies of arms, and were obliged to seek them in all quarters; they were consequently compelled to buy and repair second-hand foreign as well as English muskets, notwithstanding which they were still frequently in want of arms. During the whole of this period, the London gunmakers did good service to their country." I hope I have shown, from what has come out to-day, that we follow up the London trade in those good services whenever we have an opportunity. "The very efficient state into which the London branch of the trade was brought, is proved by the following tabular statement, in which it will be seen that in 10 years the London masters supplied to her Majesty's Government and to the Honourable East India Company, arms amounting in number to 584,376, being on an average upwards of 58,437 per annum :—

"TOTAL Supply of ARMS to Government and East India Company, London, 1841 to 1850.

DATE.	East India Company.	Government.	TOTAL.	
1841 - - -	20,150	7,660	27,810	
1842 - - -	36,353	12,926	49,279	
1843 - - -	34,880	12,270	47,150	
1844 - - -	25,362	13,496	38,858	
1845 - - -	49,623	12,539	62,162	
1846 - - -	50,880	16,336	67,216	Total of ten years 584,376;
1847 - - -	57,214	18,378	75,592	Or, an average of 58,437 for each year.
1848 - - -	55,068	23,862	78,930	
1849 - - -	71,381	26,366	97,747	
1850 - - -	26,025	13,607	39,632	
TOTAL - - -	426,936	157,440	584,376	

"As there are at present in London many skilled workmen totally unemployed, besides a great number in the establishments of the masters very partially so, I am requested by the master gunmakers of London respectfully to solicit that your Honourable Board would be pleased to do for the London trade what is

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done for the Birmingham; that is, to issue work in small quantities without tender, and give out some portion of the material now in store to be worked up, by doing which your Honourable Board will assist the masters in keeping their men together, as well as enable them to take on some of the unemployed hands, and at the same time place the London branch of the trade in a position materially to assist their country, should circumstances arise to require it." And I beg to offer the services of the London gunmakers now in any way that they can possibly be used for the country; they are quite at the service of the Government, under the circumstances.

6124. Have you the means of obtaining skilled workmen capable of setting-up the new rifle, according to its high state of finish?—Unquestionably; there is no doubt about it. Might I be pardoned for one moment: I used the name of Lord John Russell in this matter; and, if the Committee will permit me, I will explain that he forwarded our application.

6125. What quantity of arms could you set up in your own establishment, if you had an order from the Ordnance, knowing the finish required in the new weapon?—We are under this disadvantage now; we have been buoyed up; we have kept our men as well as we could, but our establishments are not in that working condition that we should like, and consequently it takes a little time to get ourselves into a working condition.

6126. What time would it take; six months?—Less than that. In three months, if it were known, there are many men in London and about the docks in a variety of employments that are working there, who would be very glad to come.

6127. Having three months to prepare, what number could you get up by the end of the year, in the succeeding nine months?—There is another question that belongs to that: who is to find the materials?

6128. Supposing that to be done as it is done by the Ordnance for other contractors?—I should suppose that I could do something like 3,000, or probably more.

6129. What do you suppose the London trade could do?—That depends upon the condition in which we are put; we are capable of a very large amount; but I suppose that in the next 12 months the London trade would perhaps get up 20,000 or 25,000 guns without much difficulty; the Committee can form some opinion probably of my establishment, and of others like it in the trade, when I state that from 1841 to 1850 I paid for wages, 105,002 *l.* 18*s.* 11*d.*, without saying what work was produced for it; it is all in the gun trade; I paid that for wages. I got up in the establishment 121,000; but, of course, if we were in working condition, I have premises, as others have, very capable of very large production; I only want some work. I am speaking for the London trade, and not for myself; we want something just to employ us.

6130. Mr. *Newdegate.*] What was the name of the viewer who viewed the guns supplied for the Peruvian Government; was he in the East India Company's employment?—Yes; his name is Brazier.

6131. Do you consider that his view was fair and satisfactory to both parties?—I have no doubt about it; it is only at overtimes in the evening that he comes, but it is in order that it shall be done.

6132. You stated, did you not, that you supply as well as finish the stock, and you supply the small materials in setting up for the East India Company?—Yes, we supply the stock and the small materials for the muskets.

6133. You spoke of the facility of having a stock of small materials on hand; I suppose you take advantage of the state of the trade at different periods, in order to obtain them at the least cost?—It is so trifling a matter, and they come to so little, that it is more a matter of convenience than their value.

6134. But being engaged in the trade, you have an opportunity of obtaining small materials, from time to time, on better terms than you could if the order was suddenly issued?—Certainly.

6135. That is one of the conveniences that your finding the small materials affords?—Certainly.

6136. You stated, did you not, that the London gunmakers could obtain materials, although Sir Thomas Hastings stated that the Ordnance could not; I mean general materials?—We never find any difficulty in supplying materials. In the year 1848, I bought myself 51,000 and odd barrels, and I never found any difficulty.

6137. You

6137. You think that if the trade undertook to find materials as well as to set up, they would not find the great difficulties which have intervened in the supply of materials to the Ordnance?—No; I do not apprehend any difficulty in that.

6138. That is the result of your long experience?—Yes; and as a proof of that, if any foreign Government came to me, and asked me for 30,000 or 40,000 guns, I should be but too glad to find all the materials for them.

6139. Do you see any practical reason why the Government of England should not deal with you on the same terms that foreign Governments do?—It is a matter that one hardly likes to speak about; the Government are wedded to a plan, and it is no interest to us to put it on one side; so long as we get our materials it is immaterial to us. If the Government said, "You must find the materials," we should bow to their decision; and if they say, "We shall continue to go on on our plan," we should bow equally. It is a question that does not affect the setter-up at all.

6140. You have expressed a good deal of feeling in common with the rest of the trade, and you say that you would be willing to serve the country in the present exigency?—There is no question about it. I would as soon speak for Birmingham as for London; and I say, that we do not look at anything that has taken place down to this moment, but anything that the Government ask us to do we are ready to do, and have the means of doing it.

6141. I ask you, in acccordance with your wish to serve the country, to give the Committee the benefit of your experience in this respect. Does your experience lead you to suppose, that if the Government of this country were to require you to supply arms in the same manner that the foreign Governments have required you to supply arms, there would be any greater difficulty in supplying the Government of England than you have found in supplying foreign Governments?—Not the slightest.

6142. Colonel *Boldero.*] Did you state, in answer to a question put by the noble Lord the Member for Totnes, that the combined power of the London trade could only produce 25,000 muskets in a year?—No, I did not mean to convey that; but I meant to convey that, in our present state, for want of a little support, we could not do at first what we should afterwards. The moment we begin to work we shall draw men who are very differently employed now, who will be too glad to come back for the manufacture of arms. In proportion as the orders increased, or the requirements, so would be the men we should unquestionably draw around us.

6143. *Chairman.*] You stated, did you not, that you procured 58,000 barrels in the year 1848?—I meant 51,000 barrels.

6144. What class of arms were those 51,000 barrels for; what was the price of the arms of which those 51,000 barrels formed parts?—They were a good serviceable store gun, fit to put into the hand of any ordinary soldier. I do not say that the British soldier would take such guns.

6145. At what price did you finish them?—Something like 26*s.*

6146. Were they for the Hungarians?—A portion was.

6147. You stated that you had in the year 1852 an order from the Peruvian Government?—Yes.

6148. For how many muskets?—I think I made about 10,000, besides some Miniés.

6149. They were made within a year?—I think a part of 1852 and 1853.

6150. Do you recollect how many months you were making them?—We were some time about them; still we were not over the time that was allowed us to do it; I do not remember how many months.

6151. For how many months did the view of those muskets last?—They were not all shipped at one time; they were shipped by 2,000 and 3,000 at a time; when a ship was going from Liverpool, if there were 2,000 ready, they would go there; and if a vessel was here, they would go.

6152. How much time intervened between the view of the first of those that were viewed, and the view of the last?—The order did not come for the whole 10,000 at one time; they kept dropping in. When we had completed 1,000 or 2,000, another order came in; it was not for 10,000 at once.

6153. What was the name of the viewer who was employed to view them?—Mr. Brazier used to come.

6154. Did he view them all?—No, I do not think he viewed the first part; I think not.

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6155. At all events, there was only one viewer at a time that viewed those 10,000 muskets?—Yes; but we had a viewer of our own, our head man, to do it beforehand.

6156. The protection to the Peruvian Government that the arms should be supplied up to their standard, was the intervention of a single viewer?—We very often had no viewer at all; it is the credit of the house that is the viewer in those cases.

6157. Do you remember what the price was?—I do not; but I think it is hardly right to ask me that question.

6158. Generally speaking, what was the price at which you supplied those different orders?—I may say 24 *s.* or 25 *s.*

6159. How many did you supply to the National Guard of France in 1830?—I do not know the quantity.

6160. Do you know where the materials were procured from for making the guns for the National Guard?—I believe from Birmingham and its neighbourhood.

6161. Were none of them supplied from the Tower?—I believe not.

6162. You stated that you had an order from the Russian Government in 1831?—Yes.

6163. Have you had no order since?—I think not.

6164. Has the London trade had no order since?—I think not.

6165. One of the witnesses stated, that the Belgians, at their manufactory at Liege, had just completed an order for 50,000 for the Russian Government; why do you suppose the Russian Government have left you, and gone to Liege?—As far back as 1830 it struck me, when I heard how it was with the Russians, having their manufactory as they had got, and yet that they could not manufacture them cheaper by machinery; and I heard that their machinery was very complete; but it does not appear that they can manufacture them by machinery if they come to Belgium for them.

6166. What were the steps and the mode of view as to those Peruvian muskets which you have mentioned; were they all taken to pieces?—No; the materials were first looked at and gone over, and then afterwards they were viewed in a finished state.

6167. If the Ordnance were to procure the guns as the Honourable Member for Warwickshire suggested, could we get them very rapidly?—I did not understand him to put that question to me; I understood him to put the question, that the materials were all to be viewed as they are now.

6168. But they are not viewed for those foreign Governments as they are now for the Ordnance?—No; but supposing it to be a Government gun that was required, the materials would be viewed as they are now; I should not expect to make up the gun, and have it viewed in its finished state.

6169. There would be precisely the same view; the only difference would be, that you would contract with the material makers instead of the Government?—That would be the whole.

6170. Colonel *Boldero.*] How many views does the Ordnance musket undergo before it is received into store?—I cannot tell that.

6171. Is it 15 or 16?—I cannot say.

6172. Do you think that they could dispense with any one of those views?—I have never looked at it as a question as to doing away with one or more views; I have only looked at it as a question of giving every facility with the view, when it does come. I cannot speak upon that point at the moment; but I am prepared to say that the gunmakers do not object to the view, but they object to the mode in which the view is conducted; it is not the view itself that we find fault with.

6173. Mr. *Newdegate.*] Would the English Government require a superior quality of arm to those which have been supplied to foreign Governments, and do you think that the different quality would interfere, so as to prevent you supplying the Government in the same way that you supply foreign Governments?—I do not think that the English Government would be satisfied, or perhaps ought to be satisfied, with the same class of guns which generally have gone to foreigners; on the other hand, I do not believe that an arm so very expensive as I have seen in this room and elsewhere, as a war arm, is at all an arm that is a bit better than one of a lower class; in no way whatever, in point of service, and its

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its durability, and all the advantages which might be got from a gun. You may give a musket the fowling-piece finish, but by that means you do not improve it if it is sound and serviceable; you may have a better gun at a less price than the new pattern will be finished at.

6174. Suppose that the quality is such as the Government may reasonably expect, and superior to the quality which is supplied to foreign Governments, do you think that the difference of quality would prevent you supplying the Government in the same manner that you supply foreign Governments, and we will suppose that an allowance is made in price for the difference of quality?—I do not think that that will interfere at all with it; I see nothing to prevent the getting up a very large amount of materials in this country, nor any difficulty in setting up, notwithstanding all that I have heard of the view. I think that, when an article comes up to be viewed, if the article is a sound article, if it is in every-way suitable for the purposes, it should be taken without an unnecessary delay; I see no reason why a soldier should have an arm so expensive.

6175. You see no reason for it; but at the same time, if an expensive arm was required, you believe that an expensive arm, allowance being made for the price, could be supplied to the English Government in the same manner as you have supplied to foreign Governments?—I would not say quite so quickly, but still it would be supplied.

6176. Then, if I understand you rightly, the extreme nicety of finish required does cause delay?—No doubt about it; it does cause delay, because you require a superior class of workmen who do not add to the use of the gun, but to its appearance.

6177. Then that superior quality limits the number of workmen capable of finishing the arm?—Undoubtedly, it will have that effect.

Mr. *William Tranter,* called in; and Examined.

Mr. *W. Tranter.*

6178. Mr. *Muntz.*] WHERE do you reside?—In Birmingham.

6179. What is your occupation?—I am a Gun and Pistol-maker.

6180. Are you practically acquainted with the trade?—With every branch of it, from the beginning of it to the end.

6181. Do you use any machinery in making guns?—Both for guns and pistols, and revolving fire-arms.

6182. Are you so well acquainted with machinery as to be able to speak to its applicability to the gun trade?—I think I am. I have had a great deal to do with machinery for a number of years, and I have tried various experiments relative to it.

6183. What is your opinion of the present mode of boring?—I have tried experiments for boring barrels out of the solid, and it answers for small ones but not for large ones.

6184. Do you mean for large diameters?—Yes.

6185. Is the expense of boring greater, as compared with the present method of making barrels?—Yes. I have also tried to bore barrels with a hole down them, and to bore them larger, with the idea of getting a straighter hole in rough boring than by the ordinary process.

6186. How did you succeed?—I could bore a barrel in that way, but it did not pay, and consequently I abandoned the idea.

6187. You could bore them in that way, but there is no saving?—There is no saving at all; it is more expensive. The present mode of boring looks rough and uncouth; but it is the best way that I have tried, and the best way that I have heard of.

6188. Have you tried a variety of tools for that purpose?—Yes, and none of them succeeded perfectly, although they appeared to remove the metal quicker. The other way does it the best. It keeps the barrels straight; sometimes they got bent altogether; and taking into account the trouble of keeping the tools in repair, which was considerable, the difference was considerably in favour of the present method of boring.

6189. Though the present plan appears to be a very rough and rude way of doing it, the simplicity of it makes it more economical than a method which is better in appearance?—Yes.

6190. Can barrels be bored so as to do without straightening at all?—They cannot be bored in every sense to be straight; there are a number of short crooks

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in them. When a barrel is bored the drill is continually forming fresh centres; there are crooks throughout the whole length of the barrel. Sometimes it may appear to come out pretty true, but there are crooks in them; and then the ordinary means of straightening is the best that I have ever seen, or tried, or had to do with.

6191. Then, rude as the present plan appears, you think that it is the best?—Yes, decidedly.

6192. With regard to lock-making, is there any machinery used in making locks?—It is generally termed "tools;" but though they are termed "tools," they are in themselves machines. If others were devised to produce a lock, they would not produce it cheaper or produce a better lock.

6193. Are you a lockmaker?—I have made them; not professedly as a lockmaker.

6194. Have you tried machines for lock-making?—Yes, for grinding the tumblers, but it did not answer any better than the present mode.

6195. Did it prove cheaper?—The difference is, I think, in favour of the present plan. A man has always got his tools about him.

6196. Can machinery be applied with advantage to the manufacture of bayonets?—It is, as I think, so far as it can be rendered profitable. Individuals who manufacture them have their own interest to consult. The machinery now used is, in my opinion, most advantageous. The grinding-stone is used considerably in the manufacture of them, and that is the cheapest plan that I know.

6197. Is there any advantage in cutting out bayonets?—It would not answer.

6198. Have you ever tried it?—I have tried cutters with other things, but this would be steel, and it would not be so cheap as the grinding-stone, nor do the work better. Cutters, when they cut steel, very soon wear out; they answer for cutting iron.

6199. Have you seen machinery applied to gun-stocking?—No; I do not know that there would be any advantages. I believe machinery has been applied to that purpose, but I should question whether the stocks could be made by machinery without any hand-labour to finish them. I do not think it possible.

6200. You do not know, of course, whether you could depend upon stocks made by machinery better than on those made by hand?—I know that a cutter, working different kinds of wood, would cut a soft piece easier than a hard piece, and consequently cut it a different size; all the wood is not alike, with the same degree of hardness, and I could imagine that the result would not be what may be desired.

6201. Is it possible to make stocks, and barrels, and locks by machinery, so that they will fit together without hand labour being required?—No; I make revolving pistols on that system to a certain extent, but they do not fit together in that way.

6202. At what price do you make them?—I have made but two kinds; one is Adams' patent pistol, with double trigger, a self-cocking and revolving pistol. The double trigger is my patent.

6203. How many barrels are there?—Five chambers projecting the charge through one barrel.

6204. What does that pistol cost?—They are usually sold at the rate of 75 *s.* wholesale.

6205. What do you think of the present system of contract; have you been a contractor?—Yes; but some tenders that were sent to me I did not fill up. I did not like the effect of contracts, and I did not fill them up. The Ordnance accepted the lowest tender, and the consequence was that it led to much unpleasantness between the masters and the men, and I did not like it; the lowest tender being accepted, it necessarily led to a very small profit to the masters, and the consequence would be, with such a very limited profit, that if they could get more they were anxious to do it.

6206. What better system can you point out?—I think a system that would be similar to the plan adopted by the East India Company; to issue materials as they do.

6207. Why do you think that better?—It works very well with them.

6208. Have you done anything for them?—No, I have done some work for the Ordnance; the old Ordnance system worked much better than the present system does.

6209. Under

6209. Under which system could the largest quantity of guns be obtained at the shortest notice?—Either the plan of the East India Company, or the plan which the Ordnance used to adopt.

6210. By contracts?—By contracts as they used to be issued five or six years ago; a larger number would be got by that means.

6211. According to the present state of the trade, is it possible to obtain a large supply of guns for the Ordnance?—I think that they could obtain any quantity.

6212. In how long a time?—Of course, if they wanted an enormous quantity in a very short time, it would be impossible, perhaps.

6213. Have you any idea of the quantity that might be supplied in the next 12 months?—In 1848, in the firm with which I was then connected, I think we made, besides Ordnance work, from 45,000 to 50,000 guns.

6214. At what price?—From about 20 *s.* to 25 *s.*; the Ordnance guns were not at that price.

6215. Have you ever seen any of the guns supplied to the East India Company?—I have seen the materials, not the finished gun.

6216. You cannot form a comparison between the quality of that gun, and the gun supplied to the Ordnance?—I do not think that there is much difference in quality.

6217. Are you acquainted with the price of unskilled labour in Birmingham?—The lowest rate of wages is about 15 *s.* a week for Irish workmen.

6218. What do you think of 6 *s.* a week; would that, in your opinion, be sufficient in the gun trade?—I should be very sorry for the men who had to work for that.

6219. *Chairman.*] Do children receive more than 6 *s.* a week at Birmingham?—Many of them.

6220. What is the ordinary rate of wages for children employed at the trade in Birmingham?—Very little children, from 10 years old, to go errands, sometimes 2 *s.* 6 *d.* and 3 *s.* 6 *d.* a week.

6221. Take them from 13 to 16, what do they get?—Sometimes 4 *s.* or 5 *s.*; if ingenious and clever, they get more.

6222. Mr. *Muntz.*] What part of the gun-work do children work at to be useful?—There is so little with which I am connected that children can go to that would be safe; they do very little indeed; I have no boys, scarcely; no girls at all.

6223. From your knowledge and experience of machinery, do you find it safe or useful, or economical, to employ unskilled children's labour at machinery?—I do not; if you employ a child at all, he must be skilful, or it would not be safe or economical; it is not pleasant to find them losing their fingers.

6224. *Chairman.*] What wages do women receive?—From 8 *s.* to 13 *s.* a week, according to their ability.

6225. Mr. *Dundas.*] If you received larger and more continuous orders, would you be disposed to introduce more machinery into your manufactory?—If it would pay, there would be no objection to it; but it is of no use if no advantage can be gained by it.

6226. Is it your opinion that the introduction of machinery to a greater extent than is at present used would pay?—I have introduced it so far as I can make it pay.

6227. Therefore, you think it would not pay to introduce it further?—So far as I am concerned, it would not.

6228. *Chairman.*] How far have you introduced it?—For polishing, rifling, making the chambers of revolving pistols, drilling barrels, planing, slotting, boring, and machinery of various kinds like that.

6229. Mr. *Dundas.*] Those are tools that are used in every manufactory; have you no self-acting tools, such as those which Colonel Colt uses?—I have not seen his manufactory.

6230. *Chairman.*] Will you describe the system that the Ordnance pursued before 1849?—The work was issued out to the contractors, and was set up; the barrel-makers had contracts, and other persons had; I never heard any particular reason for complaint, only when the price was reduced.

6231. There were fixed persons with fixed prices?—Yes.

6232. By whom were those prices fixed?—I believe the trade was consulted

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sometimes as to the value of the labour, but generally the price was fixed by Mr. Lovell.

6233. In point of fact, you approve of the system of fixing prices more than the system of competition?—That is, where the system of competition is carried on as it has been, to accept the lowest tender that was offered.

6234. Do you think that the Ordnance have accepted contracts from persons who did bad work?—No.

6235. Were not the Ordnance wise to get good work at the lowest possible price?—I do not see that the Ordnance are to blame the least; but it leads to strikes.

6236. What is the difference between the system pursued by the East India Company and that pursued by the Ordnance?—They issue the work in a somewhat similar manner, but I am not aware of any important difference, only that the East India Company do not issue small work.

6237. Are you a mechanist?—Yes; I have made a good many machines.

6238. Did you invent them yourself?—Yes.

6239. Have you tried machinery for stocks?—No.

6240. It is merely from your general idea that you speak, when you say that you do not think it would answer?—From my general knowledge of machinery, I should say that it may be applied to stocks to do some of the work, but not to finish them.

6241. Can it be applied with advantage and economy for the purpose of bringing them to a very advanced stage?—To remove some of the rough wood I think it might; nothing beyond that.

6242. Have you ever tried any machinery for lock making?—I have made tools for lock making.

6243. I mean self-acting machinery?—No.

6244. Generally speaking, you do not think that self-acting machinery can very well be applied to the gun trade?—It requires more skill to keep those self-acting machines in order; and in many instances the labour that can be obtained in a different manner is obtained at a cheaper rate, as in the screw trade. They can get labour with simple machines, and produce screws at a cheaper rate.

6245. You do not think that self-acting machinery can be applied with economy to any extent to the gun trade?—I do not know that it can.

6246. Mr. *Geach.*] You state that you have invented some machines; I suppose that you, like other people, when you have conceived the idea that machinery will do something that has been done before by hand labour, have endeavoured to invent a machine for it, but you have not always succeeded in the first instance?—No; I should be very clever if I had.

6247. It has been the result, has it not, of a long series of trials, successes, and failures, and, perhaps, at length you may have succeeded?—Sometimes a thing will answer the first time; sometimes you must try it a good many times.

6248. After you have invented a machine, and made it to answer, that is to make a thing; then comes the question, whether your machinery is really better than labour?—Machines will do bad work as well as good; they are not all like the steam engine. When you have put that to work, all that you have to do is to throw coals on the fire; but when you put a self-acting machine to work, if the tools are not kept in order, the machine does the work badly.

6249. After all the expense, you may find, when you have invented the machine, that it is not superior to hand labour?—In many instances the advantage is in favour of hand labour.

6250. Then you abandoned the machine?—Yes.

6251. It does not follow, because a thing is done by hand labour, and you may do it by machinery, that it is therefore more advantageous to it by machinery?—By no means. In some instances I have not made it answer.

6252. *Chairman.*] Have you not succeeded in many instances in applying machinery?—I make revolving pistols by machinery.

6253. You stated, did you not, that you had not seen Colonel Colt's manufactory?—Yes.

6254. Have you seen any of his pistols?—Yes.

6255. You can judge, I presume, what parts of those pistols are made by machinery; do you carry machinery as far as he does?—I do not think there would

would be much difference; in some respects he may, perhaps, use it to a greater extent than I do.

6256. You have stated that cutters could not finish bayonets because they would wear out so fast; are you aware that such cutters, when driven slowly, will cut steel for several weeks without any sharpening?—No, steel is liable to be pinny; sometimes the first time you try it, after you begin to cut a piece of steel, the cutter is spoiled.

6257. Did you not state that the present system of boring barrels was so perfect that no improvement could be made upon it?—It is the most perfect system that I know of. I know that the barrel can be bored by other means, by turning the barrel round, and I have done it; but the difference is in favour of the present system, because it is cheaper.

6258. Do you suppose that if special machines were applied to different parts of the lock they could not be made cheaper than they are now?—I do not think so; I do not think that the lock, called the store lock, could be made at all by machinery, to pay.

6259. Are you aware that engineers are in the habit of using unskilled labour to attend to self-acting machinery?—Yes; boys and women are employed to supply some self-acting machines with materials, but skilled workmen are invariably employed also to superintend them, and keep them in proper working condition.

6260. One individual attending upon several machines?—Yes.

6261. Mr. *Newdegate.*] Will you state whether you consider, taking it generally, that in the case of any complicated machinery it is safe and advantageous to use unskilled labour?—I have not found it so.

6262. Your experience is that skill is required in the use of complicated machinery?—Invariably.

6263. Have you seen the present pattern of the Ordnance musket of 1853?—No.

6264. Are you of opinion that, without compromising the efficiency of the arm, any saving may be made in the construction of it?—Judging from the quality and character of the work in other guns, I think that a portion of those restrictions may be dispensed with, and the efficiency of the arm retained.

6265. You think that there is some unnecessary finish about it which adds to the price?—Yes; and the difficulty of executing the order.

6266. And that causes delay?—Yes.

6267. You spoke of the manner in which contracts were formerly taken in Birmingham, and you stated that competition created strikes?—Yes.

6268. Does not the extreme division of the contracts increase the danger of strikes?—Strikes used not to occur under the old system, only when the price was reduced; and they generally do occur with a reduction of price.

6269. Under the old system, strikes occurred when there was a change of price, did they not?—Yes.

6270. Under the present system, where there are six or seven contractors, and sometimes more, for the parts of each musket, does not the division and publication of those contracts very often involve the contractors in strikes?—When it is known that one contract has been taken for a certain price, of course other gunmakers may have an opportunity of tendering, and through their desire of having a contract they tender for a lower price; and the consequence of that is, that in order to get that order executed with a profit, they endeavour to reduce the wages of the workmen, and that leads to a strike. This is the way the contracts have been taken under the new system.

6271. That is characteristic of the present system of contract especially, is it not?—Yes.

6272. Mr. *Muntz.*] Have you seen any of Colonel Colt's pistols?—Yes.

6273. Have you ever taken any of them to pieces?—Yes, I have taken one or two to pieces.

6274. It has been stated, that if they were taken to pieces, and the different parts thrown into a basket, they would fit together again indiscriminately; is that the fact?—I do not think they would.

6275. The other day a statement was made to the Committee as to the number of workmen employed in the gun trade at Birmingham, which was said to have emanated from you; do you know enough of the gun trade in Birmingham

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ham to be able to estimate the number of people employed in it?—I know something of it.

6276. Do you know anything about the number of men employed in it?—I do not know that. I believe that a reference was made to my name by Mr. Lancaster, in making use of an assertion relative to the number.

6277. Mr. Lancaster stated that you told him?—He asked me how many men there were in the gun trade, at that particular time, employed in Ordnance work; that was about six months ago. I said that I did not know; but, as he pressed me for an answer, I believe I admitted that there might have been engaged something like 2,000; it was a mere guess. This, I believe, referred to the Ordnance work.

6278. Are there 2,000, or 3,000, or 4,000?—I never saw any statistical table as to the trade.

6279. Mr. *Geach.*] It was a sort of rough guess?—Yes.

6280. Mr. Lancaster knew that, did he not?—Yes, I should think so; of course he would.

6281. Mr. *Dundas.*] You stated just now that you made revolving pistols?—Yes.

6282. On what principle do you make them; is it a principle similar to that of Deane & Adams's?—Precisely; it is that pistol. I have made some of those pistols, with the addition of two triggers to raise the hammer and allow it to fall at the moment it is desired.

6283. That is to obviate the necessity of pulling up the hammer with one trigger, as is done in Deane & Adams's?—It was to obviate that necessity. Besides that, there is a safety spring attached to it, so that if anything should catch it does not run the risk of discharging the pistol; and it can be carried in the pocket with safety, or in a holster.

6284. At what price do you sell that pistol?—The lowest wholesale price is 75 *s.*, for the lowest quality.

6285. Lord *Seymour.*] You stated, did you not, that you considered competition in the gun trade a bad thing?—Competition in many respects is not bad, but the effect that it has had on the Ordnance work is to cause strikes occasionally.

6286. You spoke of some former system which you considered better?—I think it worked much better.

6287. It was a system under which very few persons took the contracts and without competition, was it not?—There were a good many contractors then; more than there are now.

6288. But there was an understanding amongst them?—No; the contractors did not set the price then; Mr. Lovell generally fixed the price for the labour. The contractors then named the amount of profit, which, I believe, was never objected to either by Mr. Lovell or the Ordnance.

6289. And he sent it down to certain contractors whom he selected?—Yes.

6290. Do you prefer that principle of selection to the principle of open competition?—That principle of selection, if competent persons are selected, I think a far better system than the principle which has been adopted under the new system.

6291. It was better for those who were employed?—Yes; and in case of an emergency, if a large quantity were wanted, the Government would get a larger supply in less time under that system than they would do now.

6292. How did that system work with regard to those who were excluded?—Most of those persons who were excluded had not men to do the work, and therefore it did not operate upon them.

6293. It tended to prevent those gunmakers having any business, did it not?—They had business in other ways; I have no business in the military way now; I have had nothing to do with contracts now for five years.

6294. Is your business in the foreign trade?—In the home trade; I do very little in the foreign trade.

6295. Do you make fowling pieces?—Yes, and revolvers.

6296. For the home trade?—Yes.

6297. *Chairman.*] Do you make a high class of fowling pieces?—Yes; various qualities.

6298. Is your trade generally in a very high class of sporting arms?—It has been since I have had nothing to do with the Ordnance contracts.

6299. Your

6299. Your experience in machinery has been with regard to making sporting arms?—I have had experience in machinery for both kinds of arms, and have made and invented machinery for both kinds.

6300. Mr. *Muntz.*] Have you had anything to do with rifling guns?—I rifle all my own.

6301. What sort of machinery do you use?—The turn is obtained from a straight line with a ratchet and pinion, and I can get any turn from a straight line to a turn in two feet six inches.

6302. Did you ever see Colonel Colt's rifling machine?—No.

6303. Did you ever hear of it?—I have heard of it; I never saw it.

6304. Are there many people in Birmingham that rifle guns?—Not many; it is generally regarded as a branch of business by itself.

6305. Do they rifle them all in the same manner as you do?—I do not rifle them all the same; I have more than one machine; I do not rifle the pistols the same as the guns.

6306. How many do you rifle at a time?—Only one; a machine could be made to do more.

6307. Did you ever hear that a machine had been made that rifled 40 at a time?—I dare say a machine could be made to rifle 100 at a time.

6308. Mr. *Geach.*] You stated that you had invented machinery and applied it, but you do not mean to say that other engineers with more ingenuity might not apply machinery when you had failed?—Decidedly not.

6309. You are of opinion, are you not, knowing the difficulties to be contended with, that it would be impossible for an engineer, however clever as a matter of certainty, to surmount at once all the difficulties of applying machinery?—One man has the means sometimes of accomplishing a thing that another person may have been trying a long time and has not been able to accomplish. Still there are certain principles laid down for cutting-tools and machinery; and all machines almost, let them be made how they will, are reduced to those certain principles. Difficulties sometimes occur which seem insurmountable.

6310. If an engineer, however clever, were to say that almost all the processes that are performed by hand-labour in gun-making could be more cheaply and better done by machinery, he never having had any experience at all in making guns, would you have the slightest confidence in him?—Not the least. I never met with an engineer who could tell a crooked barrel from a straight one.

6311. *Chairman.*] Does your rifling-machine rifle them in progressive grooves?—I can do them either way; I never had occasion to do it, but I could do it. A straight line would not give a progressive groove; the machine must be expressly arranged for that.

6312. Colonel *Boldero.*] If you saw a piece of machinery in Colonel Colt's establishment for the manufacture of pistols that you had never seen before, are you not mechanic enough to carry it away in your mind?—Of course I could.

6313. Mr. *Muntz.*] Did you ever try to make the inside of a barrel straight with a straight edge?—They used to be straightened with a string, I believe, a great number of years ago, but nobody who knows anything about a straight barrel would ever think of doing such a thing as that.

6314. Were they straight then?—No; you can see a crook in a barrel to the thousandth part of an inch; if there was a short crook in a barrel, it would throw a shade in it, and you would see it easily by practice.

6315. It was conjectured the other day that they could be made straight by using a straight edge inside?—It is no such thing; the other plan is much better. I use straight edges for other work, but not for that; no man who can see a gun barrel straight by the eye would ever use a straight edge.

6316. Do you mean to say that an experienced man can make a straight gun?—An experienced man can make a gun barrel as straight as it is possible; far straighter than it can be done, either by boring, or straightening with a straight edge, or by any possible means of that kind.

6317. *Chairman.*] Do you ever rifle any of your barrels in your establishment?—Most of the pistol barrels, and the rifle guns that I make up; I rifle them in various ways; sometimes 2, 3, 4, 5, 7, 9 and 11.

6318. You have not tried the progressive grooves?—I have not.

 6319. Have

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6319. Have you not made them deeper at the breech than at the nose?—No, I have not tried that.

6320. Mr. *Muntz.*] There would be no difficulty in doing that, if you wanted to do it?—No.

Mr. *Thomas Russell*, called in; and Examined.

Mr. *T. Russell.*

6321. Mr. *Muntz.*] YOU are a Viewer at the Ordnance Rooms in Birmingham, are you not?—Yes.

6322. Can you tell the Committee what sort of instructions you received as a guide to viewing the barrels of the Minié rifles in 1851?—No, I am sure I cannot remember.

6323. Had you not written instructions?—We had.

6324. Have you any of them left?—No.

6325. Why is that?—I cannot tell why it is; they were delivered up into the office when the order was completed.

6326. Were they very strict?—Very strict.

6327. Were they so strict that you found great difficulty in viewing the barrels at the time?—No, not a great deal.

6328. Have you never found any difficulty as to whether you ought to receive barrels or reject them?—No.

6329. Had you any instructions prior to that order?—Yes.

6330. Were they the same written instructions?—The very same.

6331. What were they for?—For those last orders; for the muskets.

6332. For the line muskets?—No, for the rifle muskets.

6333. Had you any written instructions before you made the rifle muskets?—Yes, for the line.

6334. Were they as strict?—Just the same.

6335. Was there no difference?—No.

6336. How do you account for the difference that there was in the execution of the first part of the order for Minié rifles?—In the work, a good deal.

6337. Was not the work of so good a quality?—Yes.

6338. Did you ever reject any barrels, in consequence of the strictness of the view, that you yourself thought were as serviceable as those that you had received?—I have rejected barrels that may last as long, but they were either too wide at the bore, or they were made of bad iron, or too small for the gauge.

6339. You do not think that you rejected any in consequence of those instructions, which, with less strict instructions, you would have received?—No, I do not believe I ever did.

6340. You think that the instructions were only fair to the barrel makers and the workmen?—I think they were quite fair; my orders were very strict, to take none but straight barrels inside and out, and struck off free from grays.

6341. If there was the least appearance of their not being straight, you rejected them?—Yes.

6342. What part of the work did you find in 1851 was not done as well as before?—I cannot remember, I am sure. These barrels are a deal worse than they were then; it is a fresh thing to make, and they have not rightly got into it yet.

6343. In what parts of the barrel was there not good work; in the inside or the outside?—The inside and outside too. I have a plenty now that are bad barrels; they are not straight.

6344. That is the great fault, is it not?—That is not the worst fault in them; the iron is not so good, but they are getting better now.

6345. Are they better now as to their straightness than they were at first?—Yes; it was a fresh matter, the barrels altogether.

6346. Were they of a different bore?—Yes, and a more difficult job.

6347. Do you think that the smallness of the bore increased the difficulty of making the barrels?—Yes.

6348. Though the difficulty was increased by the smallness of the bore, your instructions remained the same, did they not?—Yes.

6349. Of course that operated with greater severity on the part of the workmen?—Yes, there is a deal more trouble in a narrow bored barrel than in a wide bored barrel.

6350. Now

6350. Now you depend only upon your own knowledge with reference to inspection when it is required?—I am answerable for all that I mark that are wrong.

6351. Are you liable to any fine?—No.

6352. You receive your instructions now entirely from Mr. Gunner, do you not?—Yes, and I think it will work best.

6353. Why do you think so?—I think so; I do not think that Mr. Gunner means to be so harsh with them, with the barrels, as our instructions were.

6354. You think that the instructions were harsh?—Rather so, because for small grays in the barrel that would not injure the service, we rejected it.

6355. Things that were not of any real importance?—No.

6356. You have been a gunmaker, have you not?—No, a barrelmaker.

6357. As a barrelmaker, do you not think that extreme particularity causes not only a short supply of work, but also an increase in the price?—Being over strict, certainly; if you have a good article, I expect you must pay a price for it.

6358. Suppose you were to act as strictly as possible with regard to the written directions that you have to view, do you think that any man could pass any barrel at all?—I do not think he would pass as many as have been passed.

6359. Do you think that he would pass any quantity worthy of notice?—Yes.

6360. What proportion do you think he could pass?—That I cannot say.

6361. Cannot you give a guess?—Some men's work runs a great deal better than others.

6362. Take the best workman?—I should not think it would be 15 or 20 out of 100.

6363. Do you think that any price would pay any man to work at the trade upon such a principle as that?—I do not know what the price is.

6364. Supposing a good workman was to undergo as severe a view as it was possible for you to make, with your knowledge of the trade, and having reference to the instructions you have received, could any reasonable price enable that man to get a living?—I do not know that he would get a very good living.

6365. Would he work at the trade?—Some of them do work at it, and get a living.

6366. Would not a great many more work at it if they were not so severely dealt with?—Very likely.

6367. Do not you sometimes feel a difficulty in your mind, as an honest man, as to what you ought to receive and what you ought to reject?—I go as near as I can.

6368. Do not you sometimes find a difficulty?—I find some things that are not bad enough to send back, and hardly good enough to take.

6369. Colonel *Dunne.*] You state that the small bore is more difficult to make?—Yes.

6370. Do not you think that it is quite as necessary to inspect it closely as the large bore, for that reason?—Yes; and to be quite as particular with it.

6371. Do not you think that it is your duty to examine those barrels as strictly as you are required to do, without reference to whether the workmen can make a living by the trade or not?—The price has nothing to do with me.

6372. But you are quite sure that the view with respect to the new barrel should be as strict as it is with others?—Yes.

6373. Mr. *Newdegate.*] You have only one pattern, have you?—No.

6374. Supposing you were to determine that you would not take any barrel that was not exactly up to the pattern, and it was not a *fac simile* of the pattern, how many would you pass in 100 under those circumstances?—Perhaps we may pass 70 or 80 as good as the pattern, perhaps more; I would warrant to say that I could name one man who sends barrels, and I could take 100 out of 130 as good as the pattern, every bit.

6375. Precisely the same?—Yes.

6376. Mr. *Muntz.*] How many more can you name of the same sort?—I do not view all the barrels.

6377. How many viewers are there?—Two.

6378. Mr. *Newdegate.*] You referred to one man in particular; how many barrels do you suppose that one man could make?—That I cannot say; I do not know his power.

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6379. Do you conceive that it would be possible to get a contract for 25,000 barrels completed as you think that that one man can complete his?—I cannot tell what power that man has to make them.

6380. Without considering whether he has power to make them or not, do you conceive that it is possible to get a contract for 25,000 barrels completed of the quality that that one man supplies?—I think not.

6381. You are obliged to use some discretion, are you not?—I do, as far as I dare, to keep them right with the barrels; I have sent back frequently to put a check upon them. If you were to take all that came when there was a bad one or two, or that is between good and bad in a manner of speaking, then we send one or two of them back, and then they try to do them better.

6382. In fact, you must use your judgment and discretion?—To get them as near as we can.

6383. When you were tied down strictly to very severe written instructions, you could not pass the same quantity that you do now?—No, I could not.

6384. It was your written instructions, fettering your discretion, that obliged you to reject so many in 1851?—Yes.

6385. Now that you are left to use your discretion, so as to procure the best materials for the Ordnance, you have not been obliged to reject so many?—We have not.

6386. Mr. *Muntz.*] Admitting that you do now view the barrels with less strictness than when you had written instructions, in your own honest opinion do you think that the barrels are one atom the worse for the service than they were before?—Not a bit.

6387. Lord *Seymour.*] How long have you been a viewer?—Fifteen years next October.

6388. Before that what was your employment?—A barrel maker. I worked for old Mr. Turner.

6389. In Birmingham?—Yes.

6390. Mr. *Muntz.*] Did you file for him?—Yes, and put double barrels together.

6391. *Chairman.*] Did you not state that you did, to a certain extent, exercise your discretion when acting under written instructions?—Yes.

6392. You acted strictly according to the instructions?—No.

6393. When did you cease to act according to the instructions?—I do not know; I cannot remember just the day.

6394. Was it a month ago, or two months ago?—About a month ago.

6395. Have you passed more barrels in proportion to the number submitted to you since that time than before?—Some of them have run better than others; upon the whole they have had better views.

6396. How much better?—I cannot exactly say.

6397. Do you recollect how many by the hundred you have rejected in the last month?—You never can give a correct account without you have it by you; some run worse than others; a good deal of iron ran very bad indeed; within the last month, the iron has run worse than ever I knew it.

6398. Accordingly you have rejected more?—Yes, as too bad.

6399. Colonel *Dunne.*] Is this the instruction that you received, "The barrel to be examined internally for rifling by plugging, and viewed for sighting to see that the sight be fitted square, upright, and of due elevation; to be then proved for the second time, and afterwards examined internally and externally"?—Yes, but that is for the second view, after I have done with them for the first view.

6400. *Chairman.*] Who was the barrel maker that you said made the barrels up to the mark so well?—Deakins; they are the best.

6401. Do you know how he makes his barrels?—I suppose the same as others, only he has a steadier lot of men, and they work more regularly.

6402. Mr. *Muntz.*] Do you think that the present directions given to you by Mr. Gunner are fair directions?—Yes, I do.

6403. He being the judge, if there is any dispute, puts it right at once?—Yes.

Veneris, 31° *die Martii*, 1854.

MEMBERS PRESENT.

Sir W. Molesworth.	Lord Seymour.
Mr. Muntz.	Mr. Newdegate.
Colonel Boldero.	Colonel Dunne.
Mr. Monsell.	Lord Paget.
Mr. George Dundas.	Mr. Geach.

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Colonel *John George Bonner*, called in; and Examined.

Colonel *J. G. Bonner.*

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6404. *Chairman.*] WHAT office do you hold?—I am Inspector of Stores to the East India Company.

6405. How long have you held that office?—Twenty-one years.

6406. What are your duties as inspector?—To examine into requisitions for and the efficiency of all stores purchased by the Court, and that involves a vast extent of duty, which it would take long to describe. I will say generally, that every requisition from India, of whatever kind or description connected with military supply, passes through my department. I am the party who in the first instance arranges the demand, or, as we call them, the indents, upon their arrival from India, whatever they consist of; they are placed in proper order, showing what there is in store in India, what is due upon former indents, what has been complied with, and what is proposed to be furnished. This is brought to the notice of the Court of Directors, and the stores are ordered to such an extent as they think proper.

6407. Have you the examination of the store of fire-arms?—Yes, and of all description of stores, for whatever branch of the service required, whether military, marine, medical, or civil, as well as clothing stores; in fact, the whole supply of stores for India furnished from this country.

6408. How do you provide your supply of fire-arms?—As regards the musket, the materials are provided from various *bonâ fide* manufacturers at Birmingham and its neighbourhood, such as locks, bayonets, barrels, ramrods, and brass work; the smaller articles, such as screws, nails, swivels, and the minor parts of the gun, are entrusted entirely to the setters-up, viz., the gunmakers of London, and they provide the stock also, the Company not deeming it advisable to accumulate a store of stocks; no difficulty has been found in getting them at all times from the gunmakers in London; that forms a part of their charge, of course, for setting up.

6409. What number of muskets have you ever procured in one year?—It would appear that the greatest number in one year was in 1847–48; they then amounted to 58,180 muskets. There are also other articles, which are provided in a different manner, such as rifles, Victoria carbines, and light cavalry carbines, distinct from these; sappers' carbines, cavalry pistols, sea service pistols, and wall pieces from the London gunmakers. Taking into consideration the price of the materials as the basis of calculation of their cost, we find it more convenient for the principal supply, that is, of the muskets, to buy the materials in Birmingham; and the smaller articles (which amount in the whole to a great many) are procured from the gunmakers in London.

6410. Mr. *Monsell.*] At what price did you procure your supply of muskets, when you obtained 58,000 in one year?—I cannot state exactly; it was not greater than the preceding year's supply.

6411. Can you state about what was the price?—I think the sum paid at that time was about 2 *l.* 18 *s.*, but in consequence of reductions subsequently in the price of materials, and in setting up, the same pattern musket was obtained in 1850 for 2 *l.* 7 *s.* 7 *d.*

6412. Was it a musket like the line musket of 1841?—It was very similar; there are some little shades of difference, but intrinsically we hold it to be the same arm.

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6413. Is it as highly finished?—Yes, I should say so; it is intended to be the same; our pattern is the same as to its general features; the character is the same.

6414. *Chairman.*] What number of troops do you supply with arms?—They may be taken at 250,000 men.

6415. What is your annual consumption?—It varies; we draw no average in that way; the supply of arms by the Company is grounded upon positive requirements; we do not furnish a single arm that is not asked for; a demand may come from Bengal for 15,000, from Madras for 10,000, and another from Bombay for 5,000; those are taken into consideration, and the arms, if sanctioned, are provided. During the last 10 years the whole of the demands have been completed.

6416. Can you give in to the Committee a statement, showing year by year the supply for the last 10 years?—Yes; I have a statement that will show the number from the introduction of the percussion from 1841 to the present time; for nearly three years we have done nothing.

6417. Mr. *Monsell.*] For what reason?—Because the pattern was not finally established. About the time of the introduction of the Minié rifle principle, the Court intended to take measures to provide that arm of the bore ·702, but after having almost entered into arrangements with the gun material makers, it was found that the Government intended to have a lighter arm, which is the pattern arm now established, viz., ·577 bore. It is only now that the Court have received the pattern of that arm, and it is their intention immediately to proceed in its provision; the first step will be for providing the small arm materials, such as locks, bayonets, barrels, rods, and brass-work; these are the only things that the Court buy from the manufacturers of Birmingham; as I said before, the smaller articles are provided by the setters-up.

6418. *Chairman.*] What store of arms do the East India Company keep?—We keep none in this country; we only comply with requisitions; but I may take this general view, that probably there is an arm in the hand of every soldier, and there is one spare arm for every soldier; therefore, if we have 250,000 men in India, there would be in the various arsenals in that country an ample supply of arms in store, at any rate till further requisitions could be made.

6419. Can you furnish to the Committee a return, at any period, of the number of muskets in store in India?—Certainly; we have returns every year.

6420. Lord *Seymour.*] Can you state now what number of muskets are in store in India?—Yes, 212,191; and I can give the Committee the actual amount of shipments of late years; viz., from 1840 to 1841, there were 12,000 muskets shipped; in 1841–42, 19,500 muskets; in 1842–43, 25,200; in 1843–44, 14,600; in 1844–45, 28,500; in 1845–46, 37,000; in 1846–47, 34,100; in 1847–48, 58,180; in 1848–49, 47,000; in 1849–50, 27,500; in 1850–51, 12,280; in 1851–52, 8,000; and in 1852–53, which is the last year, 5,480. They vary, in the latter years, with the cessation of military operations, and other causes.

6421. It seems that the number supplied has fluctuated every year from year to year?—Yes; according to the demand, the casualties of service, and wear and tear.

6422. Have you had any difficulty in obtaining a supply with that fluctuating demand?—None, scarcely. There may have been necessary some little forbearance towards the contractors, but, generally speaking, we have met with no difficulty. Those supplies will show that there cannot have been any very great difficulty.

6423. When you have required so large a supply as 58,000 for one year, and 48,000 for the next year, have you found the contractors raise their prices?—Never, except it was called for by those circumstances which enhance all prices.

6424. You met with nothing unfair on the part of the contractors?—Nothing at all. I must do them the justice to say that they were always particularly anxious to do what was right and proper between the Company and themselves, which it is my duty to watch.

6425. Colonel *Boldero.*] You stated, did you not, that you supply an army of 250,000 men?—Yes; all the branches.

6426. Is that the regular army?—No, it is very nearly that; between 200,000 and 250,000.

6427. Is

6427. Is there not a large body of irregular troops supplied by you?—We do not supply them all, many supply their own arms; they are provided through private agency.

6428. With regard to the store of arms, I think from 1815 to about 1835, there was no very great alteration in the soldiers' musket?—No.

6429. Since that time there has scarcely been a year without some alteration or other in the musket?—I cannot say that; but with regard to the changes that may have taken place in Her Majesty's service, we did not adopt the Minié arm of ·702 bore, fortunately, as it turned out, because there was a change in that the year afterwards, to a smaller bore. I think 23,000 were only got up for Her Majesty's service.

6430. Your store is now about 250,000 for the Indian army?—I should say that was the proportion to be kept up. The last returns show 212,191 in store.

6431. Mr. *Newdegate.*] Is there any arrangement between the East India Company and the Board of Ordnance, or is there any understanding as to your not issuing your contracts so as to embarrass each other?—None at present. I have always derived the greatest assistance and information, where it has been necessary, from the Ordnance, and officers of Her Majesty's service.

6432. But although you have not regulated your demand with any immediate reference to what might be the demands of the Government of this country, you have not experienced any serious difficulty in obtaining a supply?—Certainly not.

6433. Perhaps you are aware that the years in which your demand seems to have been the greatest, namely, 1848 and 1849, were years in which there were very heavy demands from foreign Governments upon the trade likewise?—There might have been; I was not aware of it.

6434. You never found that that circumstance created any increased difficulty in obtaining your supplies?—Never; we felt no difficulties but those that will occur at all times, probably in all orders; some little discussions or differences there may have been with the trade, but by waiting a little and exercising a little patience, and not interfering with the masters or the men, we found that those difficulties were got over, and that things went on smoothly.

6435. Perhaps the commercial knowledge of the Directors has facilitated your negotiations with the trade?—I have no doubt that the East India Company through their different committees, to whom all those things are referred, have beneficially exercised that knowledge which they possess upon every point.

6436. In removing difficulties?—Yes, if any have occurred; but I do not know that there have been any that called for special interference.

6437. They have prevented your experiencing any serious difficulty?—No serious difficulties have occurred.

6438. Having a sufficient store, you were able to wait without any inconvenience?—We have not had to wait more than a month or so at any period. I tell the trade, "I do not force upon you the delivery of the articles to the extent that I might have expected them, assured that it is your interest to supply them;" and I generally find that they do it.

6439. Having a sufficient store you are able to give that latitude?—The store is in India; the delay never extends to any inconvenient length of time. If there was an interruption for any length of time it would of course be a serious inconvenience.

6440. In the last year your demand had sunk down to 5,480?—Yes.

6441. That was an incomparably smaller amount than any of the former?—It was the necessary consequence of the ample supplies in former years; but more could have been provided if the new pattern had been determined upon.

6442. I think you stated that you rejoiced that the East India Company did not adopt the Minié rifle?—I said that I rejoiced that we did not order any supply of the new arm of ·702 bore, which was so soon discontinued. Frequent change is greatly to be deprecated, therefore I am happy that there has been no store of an arm which was so soon to be replaced by another pattern.

6443. There are also circumstances, are there not, in the climate of India, and in the physical power of many of the natives, which render it extremely desirable that they should have a lighter arm?—Yes, I think that when lightness can be conjoined with efficiency it is very desirable; but still it is advisable that we should at all times, as nearly as possible, approximate to Her Majesty's service, which is our great authority in these things. There are nearly 30,000 of Her

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Majesty's troops in India dependent upon the same arsenals, and when they want arms they use the same arms as the Company's troops.

6444. The circumstances of the climate and the physical power of the soldier undoubtedly render a lighter arm a great object in the East India Company's service?—Yes, of course it would; but I do not make any distinction in the service; a light arm is of great advantage everywhere, to diminish the burden of the soldier; but if you use a certain projectile of a certain size you must have a barrel of a certain weight; so far as you establish that you cannot lighten it very much. As to the physical power of the natives of India, we provide no separate arms, except carbines; we provide a handy weapon of that description for the native cavalry, perfectly manageable, which is a better arm, I think, than the Victoria carbine; the latter is a most unwieldy, heavy, and cumbrous weapon.

6445. This improved carbine you have obtained in some instances, have you not, by contracting for the whole arm?—Yes, in all but the essentials of the muskets we contract for the arm complete.

6446. The greatly improved carbine that you use, you have obtained by contracting for the whole arm?—Entirely so.

6447. No doubt it is essential to combine efficiency with lightness in the arm?—Yes.

6448. Probably you delayed your orders in order to see the completion of the pattern by the Ordnance?—Yes, decidedly.

6449. That probably is one among other causes which so much diminished your demand during the last years of the series that you have given?—Yes, in a great degree; indeed, it put a stop entirely to the demand; the requisitions from India for arms now amount to 30,000 muskets, which are wanting, and which we have delayed providing till the pattern has been decided upon, which is the late and improved arm.

6450. You have not yet issued your contracts?—No, we have made no arrangements whatever; we only obtained the pattern of the arm three or four days ago.

6451. As there might be an emergency in Europe, it would be perfectly within the competency of the East India Company to arrange that their demands should not inconvenience Her Majesty's Service?—The East India Company are charged with the supply of all military stores sent to India, and with them the primary object must be the efficiency of their army, and that that army should be provided with whatever may be necessary; but how far the Imperial wants should influence them is not for me to say.

6452. Mr. *Muntz.*] Are the Committee to understand, after the experience you have had, that you have never found that the gun trade have been guilty of any unwarrantable conduct when there was a great demand on the part of the East India Company?—I do not think they have.

6453. They have treated them in a tradesmanlike manner?—Very much so.

6454. You never found any difficulty in obtaining supplies within a reasonable time, nor any variation in price in consequence of the demand of the East India Company, but merely because prices generally were advanced?—No difficulty, or any variation in price, but upon the ground assumed.

6455. Do the East India Company find materials for their guns?—Yes; the East India Company find materials for the muskets; only the muskets

6456. Why do they make a distinction between those and the other guns?—Because the other guns are small in number, though in the aggregate they become considerable. We have a number of contractors: there are 28 for materials in Birmingham and its vicinity, and 16 setters up in London, making a total of 44; and it would be very inconvenient, in the case of small quantities of arms, to multiply correspondence and accounts with so many additional individuals. It originated in the first instance from the demands being small; but there are advantages, even where the quantity is large, in arms of those particular kinds being supplied entire by the London gunmakers.

6457. You supply materials for the whole of the musket?—Yes, with the exception of the smaller articles, which we think had better be left to the gunmakers in town; all the principal articles, such as the locks, barrels, bayonets, rods, brass work and nipples, are supplied by the contractors, from Birmingham, as before mentioned.

6458. You

6458. You view them much in the same way that the Government view their muskets, do you not?—Just the same.

6459. Have you found any difficulty in getting the materials brought up to the quality required?—No; it is my duty to see that they are of the proper quality.

6460. Have you ever had any complaints of the conduct of the viewer, as being over strict?—Occasionally.

6461. In that case, to whom is reference made?—To me, and I instantly redress it; I am always there from morning to night. Should any temporary illness or other causes oblige me to be away, another gentleman is there, who stands next to me. He has been in the service some 40 years, and the sub-inspector has been 33 years, and they are perfectly conversant with all the details.

6462. You have never had any difficulty in obtaining materials of the quality that you required?—No; there have been considerable rejections, and the view has been called rigid, at times too rigid, and then I look into it; I am always to be referred to at all times. The gunmakers have complained sometimes, and sometimes the barrelmakers, and sometimes the lockmakers, and I say to them, "Let me hear you both," and then, to the best of my judgment and ability, I decide. There may be men of the best intentions, and most conscientious as viewers, and there may be cases where the rule and line, and where the jig and gauge, cannot be applied, whose opinions will differ in the mere stroke of work, as it is called; but generally they have exercised a very sound discretion.

6463. Do you find any difficulty in those cases in which the gunmakers provide all the materials?—Not at all.

6464. Do the gunmakers keep up to the quality?—Yes; the materials are subjected to the same view in all the component parts; they are equally brought for examination in all the detail, and each is marked by the viewer who looks at it. They are not exonerated at all from the view; it is only to avoid the multiplication of accounts with so many different persons that minor materials are so provided.

6465. You have not found that the service has been prejudiced by issuing contracts for those arms, save and except the musket, in the complete state?—No.

6466. You have found no difficulty with the gunmakers in London in obtaining what you required?—No, with little interruptions; sometimes they come and say, "I am sorry that the barrels have not been finished so soon as I expected." Then I inquire into the deficiency, and if I see reason to blame them, I blame them.

6467. Are the Committee to understand that the parties who manage these things in India give you such timely advice of their requirements that you can always keep them reasonably supplied without great haste?—Yes; there are annual indents and special indents; and during the late wars in India the demands have been pressing, and they have been urged on directly they came; reference has been made to the Court, and measures taken for an immediate supply.

6468. You have lost no time in taking care that the orders were completed and sent out?—No.

6469. Have you found any difficulty in obtaining the materials that you wanted?—No, except those little impediments that will occur. We hold out to the different makers encouragement, and also we threaten them occasionally with a reduction of their orders; we divide our orders into 100 parts, and give them in proportions to those most capable of performing them; some have three per cent. and others 12; and then they are told that if they do not execute their orders their share will be reduced or altogether withdrawn, and thus we have been most effectually supplied.

6470. Suppose you had given out contracts to various material makers for a certain number of guns, and that some of those contractors had completed their orders but the others had not, should you keep the first part of the contractors who had completed their orders without further consecutive orders until the others had completed theirs?—Generally speaking we should, because we find that they nearly all complete them in the same time.

6471. But if they did not do so, how should you proceed?—If I found that there was any great difficulty, I should recommend that they should be struck

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off, or their proportion reduced when new orders are issued. I have sometimes recommended that a person should be omitted from the future list, but generally they have acted very fairly.

6472. You have no choice as to whether the materials are found by the Company and afterwards set up by the contractors, or whether the gunmakers find the materials and everything complete?—I think the gunmakers finding the arm complete is the exception; the other should be the general rule.

6473. You have not met with any inconvenience, have you, in consequence of the gunmakers finding materials?—No; if it had not worked well it would have been my duty to bring it to the notice of the Court.

6474. Is the operation which is called machining the lumps on the barrel, and making it ready for the lock, performed by the contractors, or by you?—By the contractors; they do it all.

6475. Do the Company ever do that?—No, the Company never manufacture.

6476. Have they never done that part of it?—Never, excepting at the time of the change from the flint arm to the percussion, when the operation was entrusted to parties on the spot.

6477. But they do not do any part of the work?—Not any; theirs is a department of provision, inspection, and dispatch.

6478. Colonel *Dunne.*] You have been asked a question by the Honourable Member for Warwickshire with respect to the soldiers in the East India Company's service having similar arms to those of the Queen's troops; is there not one great reason for that, namely, that when going into the field together they should not have two kinds of ammunition?—Yes, it is a matter of vital importance.

6479. Therefore any change that was made in the one service would be likely to be followed in the other?—Yes, on general principle; but in matters of minor detail it is open to question. The East India Company may prefer some little change, which does not affect the efficiency of the arm in any way.

6480. Do the East India Company keep a large store of arms for their Indian possessions?—They keep none in this country; but in India there is a spare arm for every man, as a general rule.

6481. From the frequent changes and improvements which are taking place in arms now, would it be judicious in any Government or any Administration to keep a very large store in hand?—I think it would be injudicious to keep more than would be likely to be required, but you must provide for the positive wants of the soldier; he must have an arm just as much as a coat.

6482. About two years ago the new Minié rifle was introduced, and about 23,000 stand were ordered. If the Ordnance had laid in 100,000 of them would it not have been very injudicious?—I would say, that any large accumulation should be well thought of; for to change a military arm, whether in the East India Company's or in the Ordnance, is a most important question, involving great expense and other serious considerations, and they are to be only introduced gradually.

6483. Lord *Seymour.*] Do you contemplate the adoption of an improved arm similar to the Ordnance rifle?—Yes, immediately.

6484. Similar to the new arm which the Ordnance have adopted?—The barrel will be exactly the same. I do not mean to say that the rest will be in all minor points the same, but the calibre or bore of the piece will. I cannot say that it will be exactly similar in every other respect.

6485. Has that been decided upon by the Committee of the Directors?—It will have to be decided upon; they have looked generally at the arm; it only came the other day.

6486. It is not finally decided as yet?—They have generally stated that we must have the arm.

6487. Having settled that, have you considered the price at which you shall probably obtain that arm?—I have hardly looked into it; I suppose it would be 3*l.* odd, knowing what the price was; the barrels are worth 11 *s.*

6488. If the price should be as much as 3*l.* odd, that would not prevent the East India Company adopting the arm if they considered it in other respects good?—I apprehend the Court will be guided very much by what is done in the Royal service; but it might be for consideration whether the cost could not be reduced without affecting actual efficiency. Upon one occasion I had to represent that; when

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when percussion arms were introduced, the first arm cost 3*l.* 12*s.*, and I brought then to the notice of the Court, that I thought it an extreme price for a soldier's musket, which, to be efficient and durable, required only an excellent, true, and well-bored barrel, a strong but well-acting swivel lock, and to be put together with neatness, but at the same time with simplicity, to admit of its being easily repaired by a regimental armourer. That, looking to the rough usage to which it is subjected in quarters and in the field, its frequent exposure to weather, and numerous other contingencies, anything beyond the above is unnecessary, and tends only to increase its cost without adding to its efficiency.

6489. If you adopt this arm, you will have to substitute gradually the new musket for the whole of the 250,000 men?—Yes; but it must be gradually,

6490. You will do that in the course of years, would you not?—Yes, as demands are made we should comply with the new demands from India, by supplying the pattern at present recognised.

6491. You do not in India furnish muskets to any of the allies of the Company?—No; they are provided, I fancy, through private agency, by gunmakers in London or Birmingham, I cannot say where; they are generally provided at the expense of the men themselves, the officers commanding the corps take it into consideration, and get them as well as they can.

6492. Is your system of tender that of open tender?—No, our system is, in setting up, to employ most if not the whole of the military gunmakers in London; they are the parties who furnish the Company; and, in the provision of musket materials, the manufacturers in Birmingham and its vicinity.

6493. Do you, when you want a number of muskets, send out to a certain number of names that you have upon the list, or how do you proceed?—I invite those who are upon the list to meet me at my office.

6494. About how many names have you upon your list?—There are 16 gunmakers.

6495. You summon those men?—Yes, to discuss the point of price.

6496. Do you describe to them the weapon that you want?—Yes, we show it to them.

6497. Do you ask them to send in tenders to you?—No, I confer with them. We generally look to the Ordnance as establishing the prices, and I endeavour to benefit by the Ordnance; we generally follow them as far as we can, and I am only too happy to pin my faith upon them. When the new percussion line arm was introduced, I obtained a pattern from the Ordnance, and ascertained what price was paid for the lock and the barrel, &c. &c.; the gunmakers never got more than that.

6498. The price paid by the Ordnance regulates your price?—Greatly so; we are not bound by their prices.

6499. Where are the parts of the musket viewed?—In my own department.

6500. At the East India House?—No, it is a separate building, called the Department of Military Stores, which is rather extensive, and nearly opposite the India House.

6501. How many viewers have you there?—At present, we have only a limite number of small arm viewers; there is little for them to do, but with an increase of work we should immediately entertain temporary men qualified to carry it on if needed. During the late war, we had several temporary viewers well recommended.

6502. Have you different viewers for different parts of the musket?—Yes.

6503. As you employ those viewers suddenly when they are wanted, do you give them any written instructions how they are to proceed?—Yes, they have certain written instructions, but they are not probably of a very minute description. They are acting under my own eye, and refer to me at all times, if either the contractors themselves or the viewers have to make a complaint. If the viewers are litigious the contractors come to me, and if the gunmakers and such people do not provide the exact things it is brought to my notice by the viewers.

6504. Practically have you ever interfered when there has been a complaint respecting a viewer?—Invariably, when there has been any ground of complaint.

6505. Do you examine the article that has been rejected, to see whether it has been unfairly rejected?—Certainly; I must see the grounds of complaint. The great thing is the standard pattern; everything resolves itself into the pattern, and if you can jig it, or gauge it, then it is tangible.

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6506. As everything resolves itself into the pattern, do you give out any pattern to the contractors?—No; but they are always within reach, and they may come and examine the patterns 50 times a day if they choose, and have another made by it if they please, and if they bring it they will have an opinion upon it directly.

6507. Do you obtain your gunpowder in the same way?—No, that is all made in India.

6508. Is none made here?—No, there are establishments of great magnitude in India.

6509. Do you obtain any stores from the Royal Laboratory at Woolwich?—The only stores that we obtain from the Royal Arsenal at Woolwich worth speaking of are iron ordnance, shot, and shells; that I may say limits our demand. With regard to brass ordnance, they have a very efficient foundry in India, but the iron ordnance and the shot and shells are provided from hence; 20 years ago the Company had their own waterside premises, and they contracted themselves for both shot and shells, for they then had the means and facilities of doing so. When a change took place 20 years ago in the commercial relations of the Company, it became a matter of necessity, not of choice, that the Ordnance should supply them, the Company having sold their waterside premises. I look upon shot and shells, being mere castings, in a very different light from small arms.

6510. The East India Company do not manufacture anything in this country?—No; but they supply every article of store: naval, military, marine, territorial, indeed everything; their manufactures in India are of such things as are susceptible of being substituted for English manufacture, and it is the object of the Court to stimulate those resources where they can, and to the fullest extent.

6511. Mr. *Monsell.*] You have had put into your hand the regulations and instructions to the viewers under the direction of the inspector of small arms of the Ordnance; are those the sort of instructions that you give to your viewers?—Yes; something very similar to those.

6512. You stated, did you not, that you had not adopted the contract system?—Not in the sense of general contracts; I think it would be very hazardous to do that.

6513. Is your present system very much like what the system of the Ordnance was before 1849?—I should think so; but I do not know precisely what their system was.

6514. What is your system now; you stated, did you not, that you had a number of gunmakers and setters-up of materials on your list?—Yes; I believe there is this difference, that the Ordnance, so far as I have been informed, supply almost all the small articles; they supply the gun stocks, swivels, pins, &c., &c., but I do not know their precise system.

6515. Lord *Seymour.*] Did you employ any contractor for muskets who is not himself concerned in making muskets?—No, I think not; I think that there is no person who is not engaged in making muskets; the Court have supported those men for a vast number of years, and they have during very trying seasons kept up those establishments, and during the time that large orders have ceased the nucleus of those establishments has also been kept up.

6516. Mr. *Monsell.*] Before 1849, I understand that the Ordnance had a return of the tradesmen and manufacturers employed by the different departments, and that those tradesmen and manufacturers were collected together, and the price was arranged; is that the system that you now pursue?—Yes.

6517. Since the year 1850, have you had much experience in procuring arms from the gun trade?—No, scarcely any; our orders have ceased, I may say, for a considerable time.

6518. Have you had any experience as to the difficulty in procuring the Minié rifle?—No, we have not set up any.

6519. Even the 5,000, that you spoke of in 1853, were not Minié rifles?—No.

6520. Are you in the habit of keeping any large number of materials in store?—We keep 10,000 sets of musket materials, generally speaking, but we have not any now. The object is, that when we receive an order from India, we can immediately put the gunmakers to work upon those materials; we then issue orders for others, and they go on and are kept at work with the 10,000.

6521. You stated, did you not, that your largest supply was in 1848, when you received 58,180 muskets in store?—Yes.

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6522. Do you remember when the order was given for those 58,180 muskets?—No; it might have been probably three or four different orders; probably 10,000 were got out at one time, 20,000 at another, and 15,000 at another.

6523. Will you be so good as to give the date of the orders for 58,180 muskets, delivered into store in 1847-48?—It must be understood that this was the amount of arms that had been shipped in that season; the orders for them were given out in season 1846-47, in three portions of 20,000 each. I will hand in to the Committee this "Return of Percussion Arms shipped to India from their first adoption in 1840, up to 1853." (*The same was delivered in.*)

Vide Appendix.

6524. Mr. *Muntz.*] You were asked whether it was not of importance, when it was possible that a change might be made in an arm, not to have a large quantity ordered; do not you think that it is of much more importance that the Board of Ordnance, or any other Board, should not be delayed by any change in the arms, in procuring the arms they want to use?—They must have arms.

6525. Mr. *Geach.*] I suppose under your system of selecting the persons who are to supply the East India Company, any man who had obtained a certain standing in the trade would be always admitted upon your list?—Yes, if he established a good claim; the list is already large, and when the Court see that they have 15 lockmakers, they may say, "These are quite enough to supply what we want; it is inconvenient going beyond that extent."

6526. Mr. *Monsell.*] Have you ever given any running orders to contractors to supply as many articles as possible at times of great pressure upon you?—No, every contract stands upon its own footing; and if we require more, we again assemble the contractors and again fix our prices, or examine their prices, to see whether they admit either of a reduction or of an advance, if they can establish ground for it. We do not have any running orders.

6527. In 1847, do you remember what number of arms were required for India at that time?—I can tell by referring to the indents; at that time they were very pressing.

6528. Were orders given in any one year, say in 1846-47, for a very large number?—We considered what we thought the manufacturers could do, and we carried the rest on to the next year.

6529. In that year you obtained as many as you thought you could get?—Yes; we had an authority to comply with the requisition, and we did it as soon as we could.

6530. You stated, did you not, that you considered that you were very fortunate indeed in not giving orders in 1851, for what we now call the old Minié, because if you had done so, and if you had afterwards been obliged to substitute the new arm, it would have been a very great loss to the Company?—Yes.

6531. I think I may infer that it is your opinion, that if any plan could be devised by which a very large number of arms could be procured with very great rapidity, it would be a very great advantage to the public service?—So far as they are likely to be brought into use or wanted.

6532. You consider that in the case of the rifle of 1851, it would have been a considerable loss to the Company if they had purchased a number of arms which in a very short time would have been considered obsolete?—Yes.

6533. Do you consider that it would be of great importance to the public service to devise some plan by which the power of production could be very much increased, and in the case of any sudden demand a very large number of arms be supplied within a year?—It would be very desirable that the Court should have the means of having their requisitions complied with without any tedious process, if it could be so arranged.

6534. There are so many new inventions now introduced, that the best arm known to-day may in a very short time become obsolete?—Yes.

6535. Therefore is it not of very great importance to endeavour, as far as is consistent with safety, to diminish the number of arms in store, and to increase the capacity of producing a large number of whatever arm may be best at any given time?—If it is to be produced in very large quantities, you assume that it will not again be changed; otherwise the existence of a very large supply is disadvantageous; if there is a probability of change, to supply your immediate and pressing wants is all that need be looked to.

6536. I infer from your answer that you would consider it a very great advantage if we could devise a plan by means of which we might supersede the necessity of having any very large number of arms in store, liable to become

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obsolete, and substitute for it a plan by which, in any one year, we could produce a very large number of arms to meet the requirements of that year?—It would be very desirable to have the means of immediate supply, there is no question of that.

6537. Mr. *Geach.*] Did you ever find any inconvenience in getting the supply that you wanted?—None, subject to the remarks that I have already made.

6538. Colonel *Boldero.*] Would it be desirable, do you think, for the East India Company to suspend for the present the change of the arm for their army, in consequence of the Government of this country having decided upon arming the whole of their troops with the Minié rifle of 1853, enabling the Government thereby to supply themselves first, and you taking 20,000 or 30,000 stand for your rifle corps in India?—We have now been waiting for two or three years, and there are 30,000 stand wanted, independently of expected demands, and it would be very desirable that we should get out the orders to a certain extent.

6539. Lord *Seymour.*] Have the gunmakers who you employ ever stated to you that they could not meet your wishes, because they were working for the Government?—No.

6540. You do not believe that the requirements of the East India Company need be limited on account of the requirements of the Government?—Certainly not. I do not think that they should be restrained. I can only look upon the paramount importance, and the responsibility that rests upon the Court for arming, in the best way they can, their troops.

6541. Have you always found, so far as your experience goes, that the gun trade of this country is able to meet both requirements?—We have not met with any difficulties but those that will interfere in all demands; if the demands are great, there is not the same ease in procuring supplies.

9542. Colonel *Boldero.*] If the East India Company declined entering into the market for the Minié rifle, the same persons who contract for them would contract for the Ordnance, and they would obtain their supply quicker than if the East India Company were in the market also?—I should think so, of course.

6543. Lord *Seymour.*] Will you state, of the 16 or 18 persons whom you employ, how many are in London?—Every one of them; all located in the neighbourhood of Whitechapel, which is the nursery and seat of the military gun trade.

6544. Unless the Government also employed the London military gunmakers, the two orders for arms would not interfere with each other?—It would throw more upon the London gunmakers if you doubled their orders.

6445. If the Ordnance do not employ the London gunmakers, whatever the East India Company may order of them is of no consequence to the Ordnance?—No, I should think not.

6546. Mr. *Monsell.*] The materials for both are obtained from the same source, are they not?—Yes, from Birmingham and the neighbouring villages.

Mr. *Edward Philip Bond*, called in; and Examined.

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6547. Lord *Seymour.*] YOU are engaged in the gun trade in London, are you not?—Yes.

6548. Have you been long engaged in that trade?—Yes, for nearly 20 years.

6549. It is the military gun trade, is it not?—I am engaged in both branches; but I have a separate establishment entirely for the military trade.

6550. Having that establishment, whom do you supply in the military trade?—I used to supply both the Board of Ordnance and the East India Company; since the Board have withdrawn their orders from London, I have only supplied the East India Company. I continued to supply them as long as there was any demand.

6551. When was the last order given you by the Board of Ordnance?—I cannot state the exact date, but it was for extra service guns; the last set up in London were finished about three years ago.

6552. When was your last order for the East India Company?—Last year.

6553. What sort of arm was it that you supplied; was it their usual musket?—Yes; it is similar in all respects, with slight differences in the pattern, to the arm employed in Her Majesty's service, termed the new line musket.

6554. That is the musket of 1842, is it not?—I do not know the date of that pattern, but it was a smooth-bore musket, and it was generally known in the trade by the name of the new line musket.

6555. Was

6555. Was the arm supplied to the East India Company as good in every respect as the arm supplied to the Ordnance?—It was exactly the same pattern and equally good in quality. There were several points which in the opinion of most practical men were even superior to that arm which was supplied to the Government.

6556. It was about two years ago, was it not, when you had that order from the East India Company?—No, not more that one year ago.

6557. The East India Company supply you with materials, do they not?—The Company supply us with barrels, locks, bayonets, and ramrods.

6558. You find the stocks, and the smaller parts?—Yes; the remainder of the small work of the gun. That is invariably the practice of the East India Company with their muskets.

6559. Do you engage to supply the East India Company within a specific time with arms?—When we receive an order from the East India Company, we are generally told at the same time in what time it is wanted, and according to that we regulate our supply; we deliver the order in regular monthly proportions, as equal as we can possibly make them.

6560. Have you at other times supplied the East India Company, besides the last order?—I have; I have been a contractor for many years.

6561. And always upon that principle of receiving the chief materials from the East India Company, and supplying the smaller articles yourself?—Yes; that has been the principle with regard to the musket, but with regard to all other arms that were required by the Company, I have found the entire arm.

6562. When you have found the entire arm, have you had any difficulty in getting the parts from Birmingham and the neighbourhood?—I never had any difficulty whatever, except upon a very few occasions; and when a slight difficulty has occurred I have taken care to remedy it by my own personal exertions immediately.

6563. Do you mean that you have made them in your manufactory?—No, I have never had occasion to resort to that; but there are so many component parts of a gun, that it requires constant individual exertion to look after them, so as to keep them all ready, and have them all in the proper time, and by seeing to that myself I have always been able to do so. If I have required one article, and there has been a delay, I have gone down to Birmingham and procured it instantly.

6564. Have you ever failed in performing your contracts?—I never recollect failing on any one occasion, either to the Board or the East India Company.

6565. Are you in a position now to take an order from the Board of Ordnance, if it were necessary, for the new rifle?—Yes, decidedly. I have lost many of my men just the same as others, but they are still remaining in London, and they would return directly they were aware that work was ready for them. I should not hesitate to take an order.

6566. When the materials are found you, how long does it take you, in your establishment, to set up a musket complete?—I must explain; I have heard it stated to this Committee, as a sort of reproach to the gun trade, that it takes six weeks to set up a gun after all the materials are supplied. In justice to the trade it is necessary to state that it takes six weeks to view the gun; it should more properly have been stated so. There are six different views for a gun, and each contractor is allowed one week for each different stage, and he can only get his work viewed on those days; I am speaking of the Ordnance and the East India Company. The system is perfectly right, but it is plain that if it requires six weeks to view the gun, it can be no reproach to the trade that they have taken six weeks to make the gun.

6567. Are you delayed by those six different views, so that the work is kept back?—No, it has not that effect; when there is a regular supply there is no delay, except the first six weeks at starting.

6568. Have you found the view of the East India Company similar to the view under the Ordnance?—I have found the view of the East India Company similar in all respects, except in the spirit in which it was carried out. It has been equally effective as regards providing the Company with a sound serviceable weapon and good workmanship, but it has certainly been less vexatious than the view of the Board of Ordnance.

6569. Has it occurred to you, in supplying the East India Company, to feel dissatisfied with the decision of the viewer, and have you wished to appeal to some

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some other authority?—It may have occurred upon one or two occasions, but I do not think that I have ever had occasion to do it. I was aware that at all times I could have immediate access to the head officer of that department, Colonel Bonner. It was known and understood that when any complaint was made he would interfere immediately.

6570. Are you acquainted with the gun trade in any of the foreign countries, in America, or any other country?—I do but a very limited export trade, chiefly in fowlingpieces; I cannot speak from my experience with regard to the common trade.

6571. Are you aware whether or not machinery is successfully used in the gun trade in foreign countries?—I am well acquainted with the gun trade in Belgium; I have not found that it is used there with advantage to a greater extent than it is here. I am aware that machinery has been introduced there to stock the gun, which is the great difficulty; but I am also aware that it has been abandoned as unsuccessful, and more expensive than the ordinary mode.

6572. Have you heard that it has been successfully employed in America for stocking?—I have heard it stated in this committee-room, but I have never seen a gun, nor seen anybody who has seen it. If the Americans can make guns by machinery so successfully, I am surprised that they do not supply themselves.

6573. Do you think the men that you have had in your employment are qualified to get up a large quantity of work in the style required by the Board of Ordnance for the new rifle?—Yes, with a little practice. They would require a little practice at first; that is all.

6574. The Committee have heard a great deal of the manufacture of pistols by machinery; have you seen any of Colonel Colt's pistols?—Yes, I am well acquainted with them. I have not seen his manufactory.

6575. Have you ever tried to interchange the different parts of the pistol?—I have tried it with a few, and I have found the statements that have been made erroneous. The pistols cannot be said to interchange; I have tried to interchange two or three barrels, and have found a difficulty; and I have tried to interchange two or three ramrods, and have found that they would not fit; the cylinders occasionally may fit, because they are turned; but I do not think, as a rule, that the parts will interchange.

6576. You have not seen machinery applied in any other manufactory in England to the making of pistols?—All revolving pistols are made more or less by machinery. There is an infinite variety of them, and you cannot make them without.

6577. If it succeeds so well for the revolving pistols, why should it not produce equally good effects as applied to muskets?—A revolving pistol and a musket are so different in their construction, that really it does not follow in any way at all. The revolving pistol is composed almost entirely of iron and metal, and from its construction it can hardly be made without machinery; whereas the musket is principally composed of iron and wood; there is a very great proportion of wood. In making a gun by machinery hitherto, the great difficulty has been to accommodate the iron to the wood after the machine has operated upon the wood.

6578. In muskets as well as in pistols, if you had an order for a large quantity of muskets, you would want to make a large number of articles exactly the same size, would you not?—We should.

6579. Would not machinery, if it answers that purpose for pistols, equally answer that purpose for muskets?—Undoubtedly; but all the minor parts of a musket are made by machinery; it is economical to use it, and they have been made so for years; the pins and the cock are stamped by machinery. Machinery enters very largely indeed into the manufacture of a musket, but it cannot be said to be manufactured entirely by machinery, the same as Colonel Colt's pistol.

6580. When you made for the Ordnance, where were your muskets viewed?—At the Tower.

6581. Will you explain the system of view there; did you send the complete arm finished?—Every week we sent down all the guns that we had in hand and that were in their different stages to be viewed; they remained there for the whole of the day, and when the Tower closed in the afternoon, they were again brought back through the streets to my manufactory.

6582. Was the same system pursued in the department of the East India Company,

Company, to which you sent arms also to be viewed?—Yes; the same system is pursued there exactly.

6583. Have you seen any machinery for the rifling of barrels?—I have not seen any machinery of new invention for the rifling of barrels; all barrels are rifled more or less by machinery, though that machinery is not generally worked by steam.

6584. You have not seen any machinery worked by steam used for rifling barrels?—No; but I am aware that one of the London gunmakers has machinery for rifling barrels by steam, of a very perfect nature.

6585. Who is that?—His name is Pritchett; he uses machinery for rifling barrels with progressive grooves.

6586. Mr. *Monsell.*] How long is it since that machinery has been set up?—I do not know; I should say within the last 18 months.

6587. Mr. *Dundas.*] Where is it?—In London.

6588. Lord *Seymour.*] Have you applied to the Board of Ordnance for work?—I have repeatedly, in conjunction with the rest of the London trade.

6589. You have not received any work, but you have been told that your case will be considered whenever there is an opportunity, have you not?—I received the same answer which your Lordship heard read in common with the rest of the London trade, and in consequence of that answer, considering that it was a written and official promise on the part of the Board, I have kept my manufactory open at a very great expense for the last two or three years.

6590. You would be now very glad if the Board would give you an order for the setting up of some of the new rifles?—I should be too glad to receive it; I have waited for it a very long time.

6591. Mr. *Monsell.*] You are aware that the Board of Ordnance have no power to fulfil their promise to you until they have a sufficient number of materials?—I wish very respectfully to say, that I think the Board of Ordnance might, if they had issued some small kind of work, have enabled us to keep our men together, so as to be ready for this large quantity of work that is now required; it might have been done at little expense, and would have preserved the gun trade in a state of great efficiency.

6592. I speak now of the rifle muskets; it is quite impossible that you can be employed until there are the materials to work upon?—Exactly; but our petition did not relate exclusively to rifles; we should have been happy to set up anything else in the meantime.

6593. Mr. *Dundas.*] You referred just now to rifling with progressive grooves, can you tell the Committee to what rifles that system of rifling has been applied?—I do not know that it has been applied in this country upon a very large scale at present, but the party whom I named is in the habit of using it for supplying his private trade.

6594. Are those rifles for private use?—I imagine they are.

6595. And probably they are not for export, or for the use of the East India Company?—The East India Company have not manufactured any rifles of that pattern yet, to my knowledge.

6596. Colonel *Boldero.*] Have you ever contracted for the East India Company and the Board of Ordnance at the same time?—Yes.

6597. The musket was the same in every respect, was it not?—Yes, with slight differences of pattern.

6598. What were the prices?—We did not know the price of the whole musket; I cannot furnish that; but the prices of setting up were as nearly as possible alike in both cases.

6599. As a practical man, do you think that the East India Company's musket is in every respect equal to that which is turned out by the Ordnance?—I think it equal in every respect; and as to the last musket, in one or two respects decidedly superior.

6600. Are you aware that the smooth-bore barrel musket of the East India Company cost 3 *s.* or 4 *s.* less than that of the Ordnance?—I am not.

6601. Mr. *Newdegate.*] You have stated that in one or two respects the East India Company's musket is superior to that of the Ordnance?—Yes.

6602. In what respect?—I would instance in particular the bayonet spring. The bayonet spring of the new line gun was of such a difficult nature to release when the bayonet was fixed, that I will undertake to say there is scarcely one member of this Committee who could release the bayonet without being shown how to do it; but the bayonet spring of the East India Company's musket

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was equally secure, and so simple that a child could remove it without being instructed how to do it. The other particular was in the lock; the lock of the new line musket for the Board of Ordnance was very short, and in consequence it crippled very much the action of the spring. The East India Company's lock was as good a lock, but they adopted a longer lock plate, which enabled the spring to be longer, and of course to act more pleasantly.

6603. Do you know by whom these improvements in the East India Company's musket were suggested?—I cannot say; I do not know whether they emanated from their own officers or the trade.

6604. Have you seen the rifle musket of the pattern of 1853?—I have seen it, but I have not been able to take it to pieces and examine it.

6605. With respect to that musket, you know that it is a banded musket?—Yes.

6606. Do you think that the mode of fastening the bands is the best that could be adopted, or should you prefer a solid band with springs?—I think that the band of the new pattern musket is liable to two objections. In the first place, the method which the Honourable Member has just described, of fixing it by screws, is uncertain; the bands may slip up in the one case, and in the other, supposing the gun to be in action, and to get rusty, I think, owing to the bands fitting so closely to the barrel, they may get rusted, and in consequence injure the barrel of the musket.

6607. Did you see the band that was on the musket that was produced here?—I cannot say that I did; I know the method of fixing the bands upon it.

6608. That is the method which you prefer to the plan adopted for the Minié rifle?—It is not so neat in point of workmanship, but I think it more efficient, or quite as much so.

6609. Do you know the ramrod of the pattern musket of 1853?—Yes, I do.

6610. Do you think that that is the best form of ramrod with a swell that can be adopted, and that the mode of fixing is the best?—That is a great deal a matter of opinion. If I understand the pattern, they have done away with the rod spring, and the rod is fixed now with a swell instead of by the old method of a rod spring; and the rod is also completely imbedded in the groove; I should think that would be an objection.

6611. Are not those the points in which the East India Company's musket was superior to the line musket of the Ordnance?—I think that the system of the East India Company with regard to their patterns is preferable to that adopted by the Board of Ordnance. I believe that when the East India Company have decided upon setting up a new arm, they send to some person in the trade to make the pattern, instead of making it at their own manufactory, as the Board of Ordnance do.

6612. They not only in that way obtain suggestions for improvement, but also they are better able to test the power of ordinary workmen to complete the arm according to the pattern at a certain price?—Precisely so; and in consequence of that there is a fairer pattern.

6613. Upon that pattern the view depends, does it not?—It does entirely.

6614. It is probably in the superiority of the mode of providing the patterns that the greater fairness and efficiency of the East India Company's view has consisted?—I cannot say that entirely; I think that a great deal depends upon the spirit in which the view is carried out. If the object is to receive nothing that can be by any possibility rejected, of course the view being in some degree a matter of opinion, you may reject 90 per cent.

6615. Still, in some degree, the better system with regard to the pattern that is adopted by the East India Company, has contributed to the fairness of their view?—Yes, I should say that that also had contributed.

6616. Is it your opinion that the view adopted by the Ordnance, or rather that pursued by their officers within the last few years, has been of unnecessary stringency to secure a good and efficient arm?—I cannot speak from experience, never having had any work for three years from the Ordnance.

6617. Previously to that time you found much difficulty in the view?—At times we found very great difficulty indeed, and the view was certainly too severe upon the whole.

6618. You mean more severe than was necessary to insure the efficiency and soundness of the arm?—Yes.

6619. Mr. *Monsell.*] Did you ever appeal to the Board of Ordnance on the subject

subject of the view?—Not personally; I have had very little trouble; my men were always first class.

6620. You merely speak of what you have heard from others?—Yes, and what I have seen myself.

6621. With your own work?—Even though I passed my work I considered the view too severe.

6622. Did you ever appeal to the Board on the subject?—No, I have never had occasion to do that.

6623. Mr. *Newdegate.*] Is it not the fact that the system of contract adopted by the East India Company is more simple than that of the Ordnance, inasmuch as the East India Company supply a very much smaller number of the parts than the Board of Ordnance do?—Yes, I think that the system adopted by the East India Company is decidedly more economical to them; they do not have the trouble of collecting the infinite variety of parts which constitute a musket, and with regard: o the smaller orders, orders for guns of which only a limited quantity is required, we have the privilege of supplying everything, and the consequence is certainly less delay.

6624. You think that their system of contract is more simple, and more consistent with the usual course of trade?—I think so.

6625. And you think that it has contributed to the great facility and regularity with which the East India Company have been supplied?—Yes.

6626. What is your opinion as to the system of making one contractor responsible for the complete arm, subject to view, as compared with contracting for the six or seven different parts of the musket with six or seven different sets of contractors?—I understand it to be a matter of expediency on the part of the Board of Ordnance and the East India Company; I am perfectly willing to work for them either way. I can supply the entire arm; but if it is considered wise that the Board of Ordnance or the East India Company should keep a stock of their own materials for the muskets, I make no objection to that; but with regard to the small work, I think it is very objectionable that the Board should supply it.

6627. As a matter of opinion, do you not think that if the system of contracting was simplified by the Board of Ordnance contracting separately for a smaller number of the different parts, it would facilitate the obtaining of their supplies?—I think that the Board of Ordnance would do well to adopt a similar mode to that of the East India Company, and if they found any materials at all, to limit it entirely to the one great arm for which there is a constant demand, and to allow in all other cases the contractor to supply the entire gun.

6628. Your opinion is this, that the system of contract adopted by the East India Company is a better system than that of the Ordnance; but you do not at present express an opinion whether it is desirable still further to simplify the system of contract, by contracting with one contractor for the complete arm?—Precisely.

6629. At the same time you stated, did you not, that if a contract was issued to one contractor for the complete arm, you believe that the contract would be faithfully and efficiently fulfilled?—I do believe so.

6630. Mr. *Geach.*] It has been stated that the difficulty in giving you orders for setting up guns was owing to the inability of the Ordnance to procure materials; if you had an order for the complete gun of the Minié rifle pattern of 1853, do you think that you would have any difficulty in getting materials?—No, I should undertake the order with every confidence of being able to execute it.

6631. That is, you would put yourself in communication with the material makers directly, and if one could not do it you would go to another?—Yes.

6632. Is there any reason why the gun trade should not extend itself according to the demand, as any other trade does in England?—Certainly not; I understand the question to mean, if there were a large demand for arms, would there not instantly arise a corresponding supply.

6633. If there was a demand for 300,000 stand of arms now, and it were gradually to grow into 400,000, 500,000, or 600,000 stand of arms, means would be found to make them?—If the trade were treated rationally at the beginning, undoubtedly we could supply any demand.

6634. So far as the private demand goes, you have had no difficulty in meeting increased and even sudden demands?—No, I have always more difficulty in getting orders than I have in executing them.

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6635. So far as the Government goes, their system has been such as to prevent their wants being supplied when a sudden demand has come?—I must say, with all respect to the Board of Ordnance, that their system of view has been so strict as, in my opinion, to amount almost to a prohibition; and that is in a very great measure the reason that they have had any difficulty in obtaining supplies.

6636. Mr. *Monsell.*] Was that before 1849?—Yes.

6637. Had the Board of Ordnance more difficulty before 1849 in procuring arms than the East India Company?—Yes; when I first came into the trade, I remember the Ordnance were in very great difficulty in consequence of the system of view. I do not remember the year, but at that time they altered the infantry gun, and it ruined half the trade.

6638. Was that when the percussion was introduced?—Yes, on the first introduction of that system.

6639. Was it in procuring the new line pattern, or altering the old guns?—I allude to the altering of the old guns; they were rejected and made wasters in a very profuse way.

6640. Are you aware that the Board of Ordnance, whether right or wrong on the subject, came to the conclusion that they could not obtain that gun in a satisfactory way from the private trade, and that they did the work altogether themselves at Enfield?—I am not aware of that, but if they did it themselves, I am sure they viewed it differently for themselves.

6641. Mr. *Geach.*] Do you know of any reason why machinery should not be applied in the gun trade, if that machinery could be profitably employed?—Certainly not.

6642. Has there been any attempt to introduce machinery, which has been prevented by the men refusing to work if it was introduced?—No, I never recollect anything of that sort.

6643. You have several processes to carry out in making a gun, have you not?—No, in my department there is less machinery used comparatively than in any other.

6644. Still you have filing, and fitting, and putting the gun together, and you have several classes of work?—Yes.

6645. If you could apply machinery to any of those processes, you would do so, would you not?—Unquestionably, if I could do it economically.

6646. The first thing is to see whether it can be done by machinery at all?—Yes.

6647. And the next thing is, whether that machinery is superior, and will produce a better quality at a lower price than by hand labour?—Yes.

6648. So far as the gun trade is concerned, there is no reason at all why, if the same encouragement were given to it by a regular and increasing demand, the same application of machinery should not take place where it was found economical?—I have no doubt that if machinery were found to be economical in stocking and screwing together a gun, the gunmakers would adopt it; but certainly our experience has been directly to the contrary.

6649. It is not that the gunmakers have refused to apply machinery, but that in all the experiments that have been tried it has not been found profitable to apply it to a greater extent than it is now?—That is what I understand.

6650. You do not mean to say that if a large demand came for guns, and a man had to make thousands where he now makes hundreds, that that might not alter the circumstances, and that machinery would not be applied?—I cannot say that; it might be.

6651. Mr. *Monsell.*] Do you know where Mr. Pritchett's rifling machine was made?—I only know that he has got it. I have seen barrels rifled by it, but I do not know where he got it.

6652. You stated, did you not, that you had inspected several of Colonel Colt's pistols?—Yes.

6653. You found that the different parts did not interchange?—Yes.

6654. Do you think it is possible for guns at a moderate price to be made so that the different parts will correspond together?—I think that there has been a great deal of undue stress laid upon the parts reversing; the pins and nipples, and a great many of those things, will already reverse.

6655. Do you consider that it would be possible, without going to any considerable expense, to have the different parts of the gun made so that they will interchange?—I do not think that it could be done, either by machinery or hand labour, to make them reverse perfectly.

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6656. Mr. *Newdegate.*] You mean in any large number?—In any number; no parts of a gun will reverse completely.

6657. Mr. *Monsell.*] I have in my hands the rules issued by the Ordnance Board in the United States, for the view of the arms that are supplied to them, and among those instructions are the following: "These arms should be fabricated in such a manner that the component parts of all the arms of the same kind shall interchange, or fit equally well together. In order to test the accuracy of the work in this respect, examine and gauge the various component parts belonging to any number of arms offered for inspection, and cause the arms to be put together by taking the parts promiscuously from the whole number examined; take then a certain proportion of the finished arms (say 10 in every 100 of the first 400 arms, after that about 10 in 400), and interchange the component parts of each of these lots of ten, as follows." Do you think that it would be possible to make arms that would stand such a view as that, without going to a vast expense?—Certainly not.

6658. You conceive that by the mode of making arms in this country, that interchange cannot be arrived at without a vast expense?—Yes, I admit that.

6659. Therefore those arms must be made in some way different from that in which arms are made in this country?—This is a gun that nobody has seen, and therefore I cannot give an opinion about it.

6660. You were merely asked whether you thought that guns could be made in this country without going to a vast expense, that would stand the view which those carbines are required to stand in the United States?—It has never been made a point in this country, and we never tried it; still it would undoubtedly be a very great difficulty.

6661. Mr. *Geach.*] Do you believe that it is done now by machinery anywhere?—The book says that it is; there should be no difficulty in seeing one of those guns, and if we could see one, I would make it as cheap as they would.

6662. Mr. *Newdegate.*] You have never seen one of those guns; have you seen any person who can attest, or have you ever heard any person state that he is prepared to attest, that a large number of those United States muskets will reverse all round?—No; I have never seen one of those guns, nor have I ever seen any person who has seen one.

6663. You have not seen any one who is prepared to attest the fact that those muskets will reverse all round?—I have not.

6664. What is the additional expense of making a pair of fowlingpieces or muskets reverse?—That would depend very much upon the gunmaker employed, and upon the price of the gun, and the quality of the gun; but as a general rule, I should say that it would add from 20 to 25 per cent. to the cost of the gun.

Mr. *Thomas Hunt*, was called in; and Examined.

Mr. *T. Hunt*

6665. Lord *Seymour.*] YOU belong to a firm in London connected with the gun trade, do you not?—Yes; the firm of Potts and Hunt.

6666. Has the firm been long established?—It was established in 1734.

6667. Are you also one of the houses that supply the East India Company?—We are, and also the Board of Ordnance.

6668. Do you supply any foreign governments?—We do.

6669. Can you state what number of arms you have ever supplied in a year to any foreign Government from your own house?—The largest number in one year was 42,743; but that does not include the arms for the East India Company and the Board of Ordnance, or our private trade.

6670. Did you, at the same time that you supplied 42,743 to foreign governments, supply any to the East India Company, and to the Board of Ordnance?—We supplied to the East India Company alone 4,243.

6671. Did you supply any in that year to the Board of Ordnance?—In that year we did not.

6672. When had you last an opportunity of supplying any to the Board of Ordnance?—Our last supply was in August 1850.

6673. What was that order?—Seventy carbines.

6674. In supplying foreign governments you supply the entire musket, do you not?—Yes.

6675. You obtain the parts from Birmingham or the neighbourhood, and supply the stocks yourselves?—Yes, partly from London and partly from Birmingham.

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6676. For that purpose have you a large quantity of stocks on hand?—Yes, we always keep a large quantity of stocks, and a large quantity of that kind of material which we think will be in demand for foreign governments.

6677. Have you a supply of materials as well?—Yes, we always keep a large supply of materials.

6678. You also applied to the Board of Ordnance for employment, did you not?—Yes, in connexion with the other gunmakers, several times.

6679. Is it your opinion also that the supply would be better met, if the Board of Ordnance supplied you with larger materials and you furnished the smaller materials?—It is.

6680. Would that expedite the supply?—Yes.

6681. That is the way in which you supply the East India Company, is it not?—Yes.

6682. Can you state why that would expedite the supply?—We find no difficulty in obtaining the supplies for the whole of the small work which is issued by the East India Company, but considerable difficulty in obtaining our materials to set up the arms for which we get contracts from the Tower. The Board themselves state that they find a difficulty, and the result is, that they are not able to give us any work; we think we should find no difficulty.

6683. Do you employ any machinery in your manufactory?—Whenever we find it practicable and economical.

6684. In what respects do you find it practicable and economical?—We make sights by machinery. We bore our barrels and turn them, and we rifle them; and when we make revolvers, we employ machinery for the greatest part of the revolvers.

6985. Have you ever visited the manufactories at Liege?—I have.

6686. Have you seen the Royal Manufactory there?—Yes, I have.

6687. Did you see their mode of manufacture?—Yes, I examined it minutely.

6688. Did you adopt any of their arrangements?—I saw nothing that I should be disposed to adopt unless it was the mode of fitting the break-offs; but as we found that our Government had set aside that kind of arm, there was no necessity for us employing that machinery. My principal object was to ascertain whether they were stocking guns by machinery, as it had been stated to us that machinery was about to be employed by the Board, and they advised us to avail ourselves of every opportunity of introducing such machinery; with that object I visited the Royal Manufactory at Liege, and I found that they had abandoned their stocking machine, finding it impracticable or not economical.

6689. Did you see their machinery for rifling?—Yes, but I saw nothing there that would induce me to alter our own mode of rifling.

6690. Do you think that they do not do it more cheaply by introducing machinery?—Their mode of leading out the barrel was evidently one of economy, as it is with all of us who have steam machines; they have a mode of applying a number of rods to an equal number of barrels at the same time, instead of to two or three, and I could adopt it instantly if I found it necessary.

6691. You did not see anything in their mode of rifling barrels that you thought it would be advisable to adopt here?—I did not.

6692. You state that you make revolvers also?—Occasionally.

6693. Have you examined Colonel Colt's revolvers?—I have.

6694. Are your revolvers somewhat similar?—We make them with what are termed revolving barrels, and with revolving chambers, which would be the same as Colonel Colt's.

6695. Do you employ machinery for that purpose?—It is impossible to make them without.

6696. Have you ever seen Colonel Colt's machinery?—No.

6697. Have you seen his revolver?—Yes.

6698. Do not you consider his revolver to be a good and efficient weapon?—My impression is that all chamber revolvers are bad; but Colonel Colt's is not the best even of the bad ones; I consider it inferior to some which are now made.

6699. You think the revolving chamber in the first instance bad?—I do.

6700. When you say "bad," do you mean that it would not last or wear so well?—I do not say that the principle is bad, but there has never been a revolver produced yet by which the escape of the gas is prevented between the chamber and the breech end of the barrel.

6701. What is the objection to that?—We hear of three or four barrels going off

off at once, in addition to the one to which the cock is applied, by the escape of gas; I have heard of such a thing.

6702. Have you ever tried them?—Yes, but I never shot out of one of Colonel Colt's.

6703. In those that you make yourself, I presume the barrels revolve?—We make very few revolvers; I prefer the barrel to the chamber in its present form, most assuredly.

6704. You have spoken of the number of muskets that you have supplied to foreign Governments; for those 42,000 what was about the price of the musket?—The price was 27*s.*

6705. Then for 27*s.* you supplied a good serviceable weapon, I presume?—Yes.

6706. Mr. *Monsell.*] In what year was that?—In the year 1825.

6707. Lord *Seymour.*] What number of skilled workmen do you suppose there are now in London?—In the military trade it is impossible to say correctly, our men are so dispersed; there are even now several of our men working upon the wool warehouses, a number are at the docks, and several are at the Tower, assisting in the correction of those badly-sighted rifles; some at Colonel Colt's, and several are gone in other directions, so that it is almost impossible to say; but I should say that there are something like 1,500 or 1,600.

6708. Do you suppose that there are not above 4,000 altogether in the country?—There must be considerably more if you take Birmingham into account.

6709. Have you no means of forming any opinion upon that?—The quantity of guns produced in one year, I think, would supply nearly the only data; we know pretty nearly how many men it would take to make 100, and how many men it would take to make 100 times that number.

6710. It has been stated to the Committee that the whole of the trade could not supply 25,000 muskets in six months?—Yes, I heard Mr. Lancaster make that statement, but I think Mr. Lancaster qualified it in a statement which he afterwards made, by saying that he knew nothing about the military trade. I was surprised that any gentleman having any knowledge of the gun trade should have made such an assertion.

6711. You think that many more than that could be provided of good quality?—Yes; in the year in which we made the largest quantity for the East India Company and the Board of Ordnance, I think our own production for foreign governments was between 21,000 and 22,000 in 1848.

6712. What quantity did you make altogether in 1848?—24,705.

6713. In 1825 you made 46,000, did you not?—Yes.

6714. Have you ever supplied materials of any kind to the Board of Ordnance?—Formerly we used to supply small work. In my own experience we have only supplied stocks occasionally; I think from 1846 to 1849 we supplied them with 12,000 gun stocks.

6715. In the rough?—Yes.

6716. Do you keep a large store of them?—About 60,000 fit for use.

6717. If you had an order for the entire arm complete, do you think that your firm could undertake the supply?—We have never failed to accomplish anything offered to us; if the whole of the materials were required of us, we should certainly supply them.

6718. You would not be afraid of it?—Not at all.

6719. With a fair view, you think that you could supply a good article?—Already we supply the East India Company, and I apprehend that we should have no difficulty in supplying the Board of Ordnance.

6720. Do you believe, supposing the Government undertook to manufacture themselves the whole supply for the country, that that would seriously injure your trade, you having this large foreign trade?—I think it would entirely ruin it, for this reason. Foreign governments generally apply for gun manufacturers for the Board of Ordnance, and of course if there were no Board of Ordnance work there would not be that staff of men and masters which are now in existence, and it would be impossible from the limited time that foreign governments give us, to get together a sufficient number of men, and as the result the orders must leave the country.

6721. Are the orders for foreign governments generally required to be executed within a limited time?—Generally, a very limited time.

6722. Could you say, when you had that order for 42,000, or when you had the order for 24,000, what was the time allowed you?—I have the whole account

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of our supplies to foreign governments since the year 1791. In the previous years to 1825, we supplied 13,000; in the following year 29,000. The large supplies have generally arisen from some extraordinary events and changes of governments in foreign countries, and I have particularly noted those of 1815 and 1826, at the time of the Burmese war; and 1831, when we supplied a large quantity to France, and also 1848.

6723. In 1831, what time was given you to complete that order?—In 1831 we supplied 42,491, and I think the greatest portion of them were supplied to the French government; 28,000 we supplied to the French government.

6724. Can you state what time was given to you for the completion of that order?—I should say, from the average of the periods for the former years, it must have been necessarily a very short space of time. I find that we supplied 29,000 in the previous year; 13,700 the following year; 1831 being an extraordinary year, and the next year falling down to the average.

6725. Mr. *Monsell.*] You do not know when you got the order for that 42,000?—I have not brought the date of the order.

6726. Lord *Seymour.*] You have not brought with you the date of the order, to show when the order was given, and when the supply was finished?—I think we have it in our possession, but I have not it here.

6727. In 1848 did you supply largely?—Yes.

6728. You stated that you supplied 24,000?—That would include what we supplied to the Tower.

6729. In 1848, when you produced that large supply, how many men did you employ in your firm?—Our average number is about 200 to 220, but on occasions like this we had to make an extra effort.

6730. Mr. *Monsell.*] At what price did you supply the foreign governments that you supplied in 1848?—From 28 *s.* to 52 *s.*

6731. What view did those muskets undergo?—They supplied their own viewer.

6732. Did they send their viewer over here?—Yes; we merely gave him the use of our viewing-room, and supplied him with packers; he viewed the guns and marked them, and they were packed under his own inspection.

6733. Was there only one viewer?—There was only one viewer at a time, but two men viewed occasionally.

6734. You stated, did you not, that you considered your rifling machine to be equal to the rifling machine that you saw at Liege?—I saw no necessity to adopt theirs.

6735. Which do you consider best, yours or theirs?—Ours we consider to be unerring; we have several sorts, and if any improvement is suggested, we entertain it, and apply it if we find it efficient.

6736. You saw no great difference?—There are various modes of cutting the spiral groove in the barrel.

6737. Is your machinery as efficient as the Belgian?—Yes.

6738. When were you at Liege?—In 1850.

6739. Did you not say that their barrels were leaded after rifling?—Yes.

6740. Are you aware whether that practice still prevails at Liege?—No.

6741. Mr. *Dundas.*] What is the present practice?—In the process of rifling there is a rough edge run up sometimes; there is a lead cast of precisely the same diameter as the barrel, or a little larger; to that is applied some chemical preparation, and it is thrust through the barrel to remove the inequalities.

6742. Mr. *Monsell.*] Mr. Lancaster's statement, to which you alluded, I think, was that he did not consider that more than 25,000 Minié rifles could be supplied in the first six months?—I did not so understand him.

6743. Do you consider that in the first six months more than that could be supplied?—I do not find him so qualify the statement in my notes.

6744. Mr. *Dundas.*] Is the practice that you described just now, of leading the barrels to remove little imperfections, practised in this country?—I think so.

6745. But that in no way deteriorates from the efficiency of the weapon?—On the contrary, it sometimes improves it considerably.

6746. Have you any doubt that it is used by the makers of high-priced rifles?—I really am not acquainted with the mode in which others effect their rifling. Almost every gunmaker has his own mode, and if he makes his gun shoot best he immediately says that his principle is the best; I apply my own principle to our high-priced rifles, and I am very well satisfied with it.

6747. You

6747. You stated that the self-acting machinery for stocking in Belgium had been discarded for inefficiency, are you aware of the nature of that machinery; were the stocks put into a lathe and turned, as they are described to be in America?—I have never seen any American gun made by machinery; I have heard a great deal about it, and I have made many abortive efforts to get hold of one.

6748. You stated that the Belgian machinery had been discarded?—Yes, I went to see it, and the superintendent showed me a room in which the machines were covered over with canvas. I requested permission to see them; he said, "There they are," and he took me into another department, and there I saw the men employed in stocking by hand labour, as before.

6749. You stated with respect to revolving pistols, that the escape of the gas between the breech end of the barrel and the cylinder was very likely to make the other barrels explode; will you explain?—I read an account, I think furnished by an officer at the Cape, that such had been the case. I had an order for some of Colt's revolvers from Vienna, and I went to Colonel Colt's to examine for myself. I could clearly see from the construction that it was impossible to be otherwise; and the result was, that I did not furnish our customers with revolvers.

6750. Does the fire make its way between the ball and the inner surface of the chamber down to the powder?—That would be the case if the bullets were not rammed in very tightly; I think Colonel Colt has attempted to obviate that by the lever ramrod, which has its inconveniences as well as its advantages.

6751. Mr. *Monsell.*] Do you remember where you got your materials in 1831, when you supplied that large order for the French Government?—I should say partly from London, partly from Birmingham and its neighbourhood.

6752. There were 100,000 sets of materials, were there not, given out of the Tower in that year?—We had some of them; the whole number of guns ever made by us with materials furnished from the Tower was 8,500.

6753. Mr. *Newdegate.*] Do you mean old materials?—I only get that part of my evidence furnished from books in existence before I was in the firm.

6754. Colonel *Boldero.*] Have you in your hand a return of the number of foreign muskets which you supplied in ten years?—Yes, ever since 1790.

6755. What is the gross number from 1830?—In 1831, for foreign Governments, we supplied 42,418.

6756. Lord *Seymour.*] Did you ever make an offer to the Board of Ordnance to supply fire-arms?—One opportunity has been afforded us of doing so in the case of the 350 double carbines in May 1851, but the conditions appended to it were so hard, that it was impossible to undertake the order. The question was, whether we could make those guns, finding the whole of the materials, in three weeks; and we said that the time was so short, the Government not usually permitting us to find the materials, that we could not do it in three weeks, but we would do it in the shortest possible time.

6757. Mr. *Monsell.*] Did you state in what time?—No, so far as I remember, we did not.

6758. Mr. *Newdegate.*] Can you state roughly what, in your opinion, would have been the time that you would have required?—I happened to know that, four or five months after the guns had been taken by a non-practical man, that some of them came to our manufactory, and our men assisted in making them up.

6759. So that the order took about five months to complete?—I think quite that, and much longer.

6760. Mr. *Monsell.*] How came it that an order for so small a number took so long as five months to complete?—In consequence of its going into the hands of a non-practical man; no military gun-maker accustomed to the trade would have taken guns to make in the space of time that he did.

6761. Do you think that five months was an unreasonable time?—Decidedly, those guns were in hand an unreasonable time.

6762. What would have been a reasonable time?—I cannot tell; I forget almost the nature of the arm, but I was very much astonished to find that the guns were not stocked five months after the order was taken.

Mercurii, 5° die Aprilis, 1854.

MEMBERS PRESENT.

Mr. Monsell.	Mr. Muntz.
Colonel Dunne.	Mr. Geach.
Mr. Walpole.	Colonel Boldero.
Lord Seymour.	Colonel Lindsay.
Mr. George Dundas.	Lord Paget.
Mr. Newdegate.	

WILLIAM MONSELL, Esq., IN THE CHAIR.

Mr. *John Macdonald*, called in; and Examined.

Mr. *J. Macdonald.*

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6763. *Chairman.*] WHAT are you?—A Carpenter and Joiner.

6764. Do you recollect a tender by Messrs. Thompson for 10,000 boxes?—Yes.

6765. At what rate was the tender?—At 7 *s.* 10 *d.*

6766. The 10,000 at that rate would have amounted to 3,916*l.* 13*s.* 4*d.*?—Yes.

6767. Did you undertake to make those boxes at the Royal Carriage Department?—Yes.

6768. At what rate did you make them?—A box similar to the pattern given to Mr. Thompson, we could make for 3*s.* 8¼*d.*

6769. And with the alteration made by Colonel Tulloh, for how much?—A penny less.

6770. Do you consider that your boxes are in every particular equal to the boxes which Messrs. Thompson were in the habit of supplying?—They are equal in every respect; they are superior in some.

6771. Will you explain the difference between the two?—Taking this box (*producing the same*), in undoing the screws of the old pattern there is great difficulty in getting the lid removed; the box will hang. In the new pattern that is removed, and nothing could ever keep down the lid; that is a very great advantage in the new pattern of Colonel Tulloh's.

6772. You state that the difference between the price of the two boxes would be about one penny?—Yes.

6773. Are there as many screws in Colonel Tulloh's box as in the other?—No; we are this screw (*pointing to the same*) deficient; also these toe-pieces in Colonel Tulloh's new pattern; we have an additional amount of labour, which is nearly equivalent to the additional expense of the brass work on this box.

6774. Will you explain to the Committee what that arises from?—In the new pattern we have to form this tongue (*pointing to the same*), which runs into a great amount of labour; there is also the form of the groove in the end here (*pointing to the same*), and they get these hauncheons. There is another additional expense in this lanyard, which is not in Mr. Thompson's box; there is the boring of the hole and counter-sinking for the nut, which occupies time equivalent to Mr. Thompson's box; say one penny.

6775. Is the brass work in your box equal to the brass work in Mr. Thompson's?—According to the quantity that we have, the brass work is equal in quantity.

6776. Is your timber equal to Mr. Thompson's timber?—In every respect.

6777. Have you compared a large number of your own boxes with a large number of Mr. Thompson's?—Yes, and I find that ours are equal to his.

6778. Mr. *Geach.*] You have a paper in your hand; is that your estimate?—Yes.

6779. You

6779. You have an amount there of 437 *l.* 10 *s.* for timber, that is at 7 *d.* per foot run; where did you get that price from?—From the timber master of the Royal Carriage Department.

6780. Was that of timber that he had in stock?—Yes, timber that he had in stock.

6781. How long had it been in store?—Some time; I cannot exactly say.

6782. You have put down 15,000 foot run; had you to cut those up?—Yes.

6783. How do you do that?—By circular saws.

6784. What is the waste in cutting?—We get four boards out of a three-inch deal.

6785. What do you allow the 11 per cent. waste for?—On each deal, taking a certain number of boxes out of each deal, by taking an 18-feet deal we get 12 boxes out of that, which leaves two feet waste in the length of the deal, independently of the three-inch board; the sum is 3,300 feet run of three-inch board, that we have independently of this 11 per cent. allowed for waste, taking the lengthway of the deal.

6786. When, after deducting 11 per cent., it is reduced into the shape of the board cut into the length for the box?—Yes; 16 feet cuts length enough for the box; we have two feet of spare wood in the length.

6787. What is the thickness of that deal when you send it to be desiccated?—It is five-eighths full, rather more than that.

6788. Do you find that, after being desiccated, it will come up to the three-quarters?—No, it gets no larger by desiccating.

6789. Is it not necessary that it should be of a greater thickness before you send it to be desiccated, in order that it may be of the required thickness when it comes back?—The difference caused by desiccating is so trifling that we hardly know there is a difference, taking it only in eighths; there is a difference in taking nine-eighths widths.

6790. Afterwards you are able to come up to the five-eighths, the size required?—Yes.

6791. Is there no waste in desiccating?—Yes, there is a shrinkage that takes place by that process.

6792. Have you allowed for that waste?—Yes, all that is taken into account.

6793. Where?—In the per-centage that we have allowed here.

6794. Which per-centage?—The 11 per cent. for the deal.

6795. Then that 11 per cent. allows for all the waste in desiccating?—Yes; we have nearly another one per cent. which we have not taken into account, which would more than compensate for the desiccating.

6796. Did you, in using those deals after they were cut up, select them?—Yes.

6797. What quantity did you reject?—I am not prepared to say the exact quantity that was rejected, but in rejecting that wood it can be used for other purposes in the department.

6798. Supposing another person had to get timber, and to pick out all the timber without knots in it, would not he select the most valuable part of it?—We would not throw the knots to one side; we would use the timber with the knots.

6799. If you were called upon to throw them on one side, you would take the most valuable timber for this work?—Yes, but that would be almost impossible to do.

6800. *Chairman.*] Did Mr. Thompson throw them on one side?—For every box that there are knots in, I could produce the same number in Mr. Thompson's.

6801. Mr. *Geach.*] It would make a very great difference, would it not, in the cost of those boxes, if they were made from wood without knots?—Yes, but it is nearly impossible to make boxes without knots; in an 18-feet length we would not get three feet without knots.

6802. If persons were required to make those boxes of timber without knots, or almost free from them, and of a particular kind, that would increase the expense, would it not?—Yes, it would; in making out an estimate for the work, I believe it is generally stated in the estimate that dead knots, or unsound knots, are not to be used. I believe that in the estimate drawn up for Mr. Thompson's contract, it was said that knots were not to be used; that meant dead or unsound knots, but there can be no detriment to the box because a knot is in it, if it is sound.

Mr. *J. Macdonald.*

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6803. Are there any knots in the pattern?—No, I think not.

6804. Was not the contractor expected to make the boxes according to the pattern?—In size and thickness, and every other respect; as to knots I do not consider that he was.

6805. Not as to the quality?—Yes.

6806. Have you not found that the pattern has no knots in it, while the box that you produce has knots in every part of it?—There are a few small knots in it, I believe.

6807. How many knots are there in that first side?—Two.

6808. Now how many are there in the next side?—Three small knots.

6809. How many are there on the top?—Two.

6810. On the sides how many are there; or will you say how many knots there are on that box altogether?—Seven, I see.

6811. Are there any knots in the box that Mr. Thompson was required to work to?—No.

6812. You cut the wood by a circular saw, did you not?—Yes.

6813. What is your estimate for cutting that 15,000 feet of wood?—I take the different machines together, and I take the time occupied in doing a certain portion of the work. I am not in possession of the time that it took to each article.

6814. Do you know how much per dozen cuts would be a fair price for cutting down those deals?—Three shillings per dozen cuts, 12 feet long; that is the price that I would have to pay, if I had to cut it in the saw-mill, I believe.

6815. You have made an estimate of 10,160 feet of three-quarter elm, at 3 *d.*?—Yes.

6816. There you allow 23 per cent. for waste?—Yes.

6817. But there you have that elm one and an eighth thick before it is desiccated, have you not?—No, we cut it up; we took a large piece of elm that we have used for our boxes, which has not been desiccated at all; it had been in store for some years, and it was so dry that it did not require desiccating.

6818. But you did require all the timber to be desiccated in the other case, did you not?—Yes, but in making our tender out we have allowed for desiccating enough for the elm and the deal together.

6819. Do you think that that 23 per cent. of waste is sufficient to cover the cutting up of that elm?—I believe it is quite sufficient.

6820. Is there any extra labour in sawing and facing over this elm?—With one machine we plane; we take 2,000 elm lengths, or enough for 1,000 boxes, and with the aid of machinery we do that in two hours, but by the system adopted by Mr. Thompson it will take seven days. Those are the great advantages that we gain by our machinery over manual labour.

6821. Are you sure Mr. Thompson did not use machinery for the same purpose?—I know that he used none to do the boxes made according to the last tender, the last 10,000 made for the Government, excepting the cutting up of the material.

6822. With regard to the metal work of the boxes in Mr. Thompson's boxes, there would have been 30,000 screw bolts for the 10,000 boxes, would there not?—Yes.

6823. At what price have you taken your screw bolts?—We can make them in the carriage department at 1½ *d.* each.

6824. How have you arrived at that estimate?—The foreman superintending those works weighed the quantity of metal required for a number of screws, and the time occupied in the casting of them, and the time occupied in making them.

6825. Do you know what you could buy them for?—I am not prepared to state that; I do not know; that is what we can make them for in the carriage department.

6826. Then those two screws which you have there would cost you 3 *d.*?—Yes.

6827. How many screws and plates are there?—Three plates and three nuts belonging to the screws.

6828. Besides that, in Mr. Thompson's box there is other brass-work?—Those two toe-pieces (*pointing to the same.*)

6829. What

6829. What is the value of those?—We can make them at a halfpenny each in the carriage department.

6830. According to the estimate of persons in that department?—Yes.

6831. Have you any idea what you can buy them at?—No.

6832. Have they always been made in the carriage department?—We never have made any of them; I consulted the foreman who superintended the making of the screws, and he said he believed we could make them at a fraction less than a halfpenny each; the two only weigh one ounce, which gives 32 to a pound; they are very light, and but little metal in them; this is by applying machinery, as we do, to the making of them.

6833. Do you know whether any of the other pieces have been purchased?—None have been purchased; I believe whatever we have, we have made ourselves.

6834. The price given for the screw bolts is 1½ *d.* each?—Yes.

6835. And the two pieces there you consider could be made for a halfpenny each?—Yes.

6836. Do you know what you pay for desiccating?—The timber master of our department gave me the price that it would cost for the desiccating of the whole 10,000 boxes, which is a penny a box in this estimate that I have here.

6837. In the process of manufacture you would have to cut up those deals into pieces?—Yes.

6838. And you would have to cut up 90,000 pieces for the 10,000 boxes?—Yes.

6839. Do any of your men work by piece-work?—No; all by day-work.

6840. What price have you taken for those 90,000 pieces?—The way I took the prices was this. I took the quantity of work that each machine could do; and by adding that and the time together, and dividing by the number of boxes, it produced so much time, with the manual labour that we employed at the boxes.

6841. Have you included all that in your cost of 9 *d.* a box?—Yes; after we cut the deals, we take and mark out so many lengths, and we plane them up into those long lengths; we then take them to the planing machine, and plane 900 in one hour; and I calculate that in cutting them in short pieces, and doing this by manual labour it would take nine hours; we gain nine to one by using machinery for planing up the sides and bottoms alone.

6842. Do you know whether Mr. Thompson uses machinery?—He did not in the last contract.

6843. What should you consider it would cost to cut up 90,000 pieces?—I could not exactly say.

6844. What would it cost for each piece, or each box?—We would cut up enough for 20 boxes in about 10 minutes.

6845. All ready to put together?—Yes, cut to lengths all ready to put together.

6846. What time do you consider it occupies a man to put a box together?—A man puts 40 boxes together in one day.

6847. That is a day's work?—Yes.

6848. Does he take the timber as you say it is cut from the saws?—No; we have to take the different pieces to different machines, to complete them before the man gets them in his hands to put them together.

6849. How many machines do you use?—Nearly nine altogether we employ for making those boxes.

6850. After that they come to this man to put them together?—Yes.

6851. Is there any hand labour bestowed upon them before they come to the workman to put them together?—Merely in putting the nuts and filing them; the nuts are let in at the side here (*pointing to the same*), and there are persons employed in dropping in the nuts and filing those pieces; we cut out the mortice, and bore those holes for the machine (*pointing to the same*), to lessen the expense; we are now making a machine that will bore 24 holes, 12 on each side, by merely a simple movement of the hand, which would not occupy half a minute. I suppose that the cleats of those boxes are entirely done by machinery; we have no hand labour at them, except screwing them on and hollowing the cleats here (*pointing to the same*), to receive the grummet;

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we do this as fast as a man can take them in his hand and put them down; we can do 20 of those in about three minutes; then there is the hollowing out again of the cleats to receive the rope handle.

6852. How many boxes have you made now?—We have 500 completed, and we have 2,000 ready, all but the lids.

6853. When did you receive the order for making them?—It is about six weeks ago since we first commenced.

6854. You have been six weeks producing 500, and getting 2,000 in a partial state of preparation?—We have material ready for nearly 5,000 boxes, and we have 2,000 altogether put together.

6855. How many men have you employed at this work?—Twenty-five, who have not been employed all the time at this work, but at other work.

6856. How long have the 25 men been employed at that work?—Perhaps three weeks out of that time.

6857. What are those men employed at; putting them together?—Yes, letting in those nuts, and screwing on those cleats.

6858. If those 25 men could complete 40 a day each, that would be 1,000 a day?—Yes, but we have been preparing the other portions of the work; we have not got them put together.

6859. You have only got 2,000 completed now?—Yes; we have 500 entirely finished, and altogether 2,000 in hand ready for lids, and some 3,000 or 4,000 more; I am not sure.

6860. In what state of preparation are the 2,000?—We have them cut to the lengths, and partly morticed for the nuts, planed up, and brought to the width.

6861. Did not you state that that was all done by machinery?—Yes, so it is.

6862. Then what have the 25 men been doing?—The planing up the surface of the stuff is not done by machinery; we do it by hand labour, the flat part; we do them in long lengths, which occupies less time. Mr. Thompson cuts them all in short lengths, and planes them in that state, which takes a great deal longer time than we take in planing them in long lengths.

6863. If those 25 men have been engaged all this time, you certainly cannot make them at the rate you stated; have you had any man that has made 40 a day for a week together?—We calculate the time that is taken at each machine, and the time taken by manual labour, and by adding that we produce the amount that I have given.

6864. You stated that one man could put 40 of them together in one day?—Yes; but those men have not been employed during all the time.

6865. They have not actually done that for a week together; no one man has for six weeks made 40 a day?—He nailed together 40 a day.

6866. For how long?—We were not occupied for more than about a week at that work, putting them together.

6867. How many men were engaged putting them together?—Sometimes 23 or 24; it has only been the last week that we have had 25.

6868. If two men had worked continuously for a week, and put 40 a day each together, they would have finished 480 out of the 500?—Yes; one man would make five boxes in one day.

6869. What would he do to the boxes?—That would be taking the whole of the work together; the work performed by machines, and the work that we do by hand labour.

6870. That is merely an estimate; you do not actually say that one man, who is paid so much a day, would do that, but you calculate the power of the men and the machinery?—Yes; to some machines we have boys attending, and to some men; that is what we actually do with the assistance of machinery.

6871. When you state that one man can make five boxes a day, you get at that by supposing that he has the assistance of certain machinery?—Yes.

6872. Have you estimated what the power of that machinery is?—We calculate the time that the man is attending the machine.

6873. You state that one man, with the assistance of machinery, can make five boxes a day?—Yes.

6874. But that man does not do all the work?—We have the work divided; there are several men; there is one attending each machine, or a boy, and by taking the time of each we can produce 10 boxes per day by one man.

6875. How

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6875. How many men have been engaged since the commencement; you say that there have been only 25 lately?—It is about six weeks since the men were first entered; since that time other work has come in that was pressing, and we were obliged to take the men off this work to do the other.

6876. Can you say positively what the men would have done if they had been working entirely during those six weeks at those boxes?—We took a certain number of boxes and the time occupied in making them, and by doing so we produce the result.

6877. You estimated the time?—I took the actual time employed.

6878. You could not have taken the actual time occupied by one man in making five boxes, because many men were engaged upon this work, and they were making other things?—I took the time occupied at each machine to do a certain number of boxes, and by taking and adding all the time together and dividing by the number of boxes, that gave me the exact time occupied in making that number of boxes.

6879. When were those 500 boxes delivered in?—They were delivered over to the store last Wednesday week.

6880. All of them together?—Yes.

6881. Those were all that were ready at that time?—Yes.

6882. Who inspects them after they are made?—I am supposed to inspect them, having the superintendence of the making of them.

6883. All that you pass are considered to be perfect?—Yes.

6884. No one else inspects them?—No.

6885. Who inspects Mr. Thompson's boxes?—The master carpenter, I believe, and they are inspected also by the storekeeper.

Mr. *Joseph Thompson* called in; and Examined.

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6886. Mr. *Geach.*] YOU have had contracts for making ammunition boxes for the Government, have you not?—Yes.

6887. How many have you made?—I supplied them with 10,000.

6888. When was that contract made?—It was made in 1853.

6889. Was the contract made with you privately, or was it advertised?—There was public competition.

6890. Do you know whether other persons tendered for it?—Yes.

6891. I suppose yours was the lowest price?—Yes, I have every reason to believe so.

6892. You were applied to some time ago to ascertain whether you would take another 10,000 at the same price, were you not?—Yes; I received a letter from the Board.

6893. What was your reply?—That I could not make them, on account of the advance in the price of materials, for the same price, but that I would make them for 7 *s.* 10 *d.*; I should mention that afterwards that was corrected. I was called on late one Saturday evening for my estimate, and I promised that I would deliver it on Monday morning by half-past 10. In the meantime I had not sufficient time to make my proper calculations, and to ascertain the state of the market, and accordingly I sent in an estimate for 7 *s.* 10 *d.*, which afterwards I corrected. I will read the letter which I sent to the Honourable Board afterwards.

6894. At what date were you asked to tender first?—I believe on the 4th of February.

6895. On a Saturday night?—Yes; and I sent my estimate on the Monday; then this letter was sent on the Thursday or Friday; three or four days elapsed. I made my calculations after I sent in my previous estimate, and I then wrote to this effect: "We beg to inform your Honourable Board, that not having received an answer respecting our estimate for the supply of 10,107 small arm ammunition boxes, which was delivered in haste, we have taken advantage of the time elapsed in making the requisite calculations, so as to ascertain the lowest possible price for which the said boxes could be executed, being only desirous of obtaining a fair remunerative price; and being fully acquainted with the nature of the work, having every facility for executing the same. We defy competition when we state to your Honourable Board that we are willing to execute the said boxes for 7 *s.* each. Trusting that your Honourable Board will perceive

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perceive that we, by this offer, desire to maintain that confidence which we have had the honour to enjoy for some years." To that I had no answer for about nine or ten days. Then I applied to the Board to know whether my tender was accepted, and I received an official letter from Mr. Wood, stating that my offers were rejected.

6896. Before you received any communication, you made the correction as to the 7 *s.* 10 *d.* and substituted 7 *s.*?—Yes, and I had no intimation at all.

6897. So that the statement that was made, that your offer was 7 *s.* 10 *d.*, was made after you had made an offer to do the same for 7 *s.*?—Yes, decidedly. I will explain to the Committee how that arose. I ascertained that I could obtain the metal-work; I had a definite estimate, but I had not had time before; and, as I promised, I sent a letter to the Board on the Monday morning; a special messenger was sent down on Saturday evening, and I sent it accordingly; then I was obliged to secure myself. I had called on an agent in town on Monday morning, and he led me to suppose that there would be a great advance in the metal-work; afterwards I received an estimate, and it was not the case, therefore I gave the Board the advantage of it.

6898. Have you since made a close calculation of the lowest price at which you could make those boxes?—Yes.

6899. What is the price; that is, without any profit to yourself?—The net price that those boxes can be produced for is 6 *s.* 0 $\frac{3}{4}$ *d.*

6900. Have you seen the means that they have at Woolwich for making those boxes?—No, I have not.

6901. Do you know what machinery they use there?—I do not.

6902. To what extent do you use machinery yourself?—In almost every possible way that it can be applied; we have powerful machinery adapted, and are ready to turn it to advantage in every way, which we should undoubtedly do.

6903. You cut by a circular saw, do you not?—No, we have a readier method than that; we can cut a dozen cuts in a deal at once; we have two large vertical frames, and we can cut 1,000 deals in a day if we like.

6904. In your estimate, taking the price of the deals at the rate at which it is taken by the Ordnance, that is 7 *d.* per foot, what should you add to that to bring the deals into three-quarter stuff fit for 10,000 boxes?—I consider in the first instance that you would not be able to purchase the deals at that price; out of 100 deals, or 120, you would not get above half of them fit to put into the mill to cut; then upon every deal there is what we term the heart in it, and that in general runs very shaky, so that the fourth or outer board of the deal would be shaky and not fit for the service. That would entail one-fourth waste in the deal in that state for this particular service, but it would be applicable for other purposes. Then again, in reference to that stuff, when sent down to be desiccated there would be an amazing amount of waste; beautiful sound boards, when sent from the mill into those desiccating rooms, are twisted and shaken from one end to the other, and the knots drawn right asunder.

6905. Then it is not correct to say that every piece that goes to be desiccated comes back perfectly sound?—No; you may reckon one-fourth waste.

6906. In the desiccating process?—Yes.

6907. Then to reduce 15,000 feet of three-inch deals down to inch deals, taking into account the desiccating process, the waste would not be covered by 11 per cent.?—No; I have made a close calculation, having executed some quantity of boxes before, that 11 per cent. would only allow for the waste which would take place in reducing the board to the width required; and as to the defects in the best quality of deal that you can select, in sending it to the desiccating room, after it is returned home we shall find by that process that we shall have at least a loss of 20 per cent. in cutting out the knots, which will be split in the Onega deals; a beautiful sound knot will be torn right in two by the great heat, and that knot must be cut out, whatever sacrifice it may cause. If they accept a knot it must be one perfectly sound; they will not have a pin knot or a dead knot; not one knot in 20 can you get from the desiccating works but what would be split in that way.

6908. Supposing they got the timber at 7 *d.* a foot, what do you add to that amount of 437 *l.* 10 *s.* for the waste in cutting and in the process of desiccating?—At least 31 per cent.

6909. That would make a difference of 87 *l.* 10 *s.*, would it not?—Yes.

6910. You

6910. You had to cut those deals into pieces?—Yes.

6911. There are 312 dozen cuts?—Yes.

6912. What do you pay for that?—The price is 2*s.* 9*d.* a dozen.

6913. What does that price include?—That simply includes three cuts into the deal; we cut a dozen cuts in a 12-feet deal for 2*s.* 9*d.*

6914. Is that the payment of the wages of the men?—No; the actual price for cutting the deal.

6915. You cut it yourselves, do you not?—Yes.

6916. It is the estimated price, is it not; is there anything for machinery in it?—This price is what we cut for the trade for.

6917. It is not what it costs you?—As nearly as possible; some of the large mills, the largest now, charge 3*s.* or 3*s.* 3*d.*

6918. You heard the evidence given by Mr. Macdonald, did you not?—Yes.

6919. He states that 2*s.* 9*d.* was about the price; with that 2*s.* 9*d.* how much would that add to the cost?—There would be 3,750 cuts in 12 feet deals, being equal to 312½ dozen cuts, and that would amount to 42*l.* 19*s.* 4½*d.*

6920. So that you make the deal when reduced to ¾-inch stuff, for the 10,000 boxes, cost 567*l.* 19*s.* 4*d.*, which the Ordnance make to cost 437*l.* 10*s.*?—Yes; and that I believe conscientiously to be under what it could be produced for.

6921. In the same estimate there is a charge of 126*l.* 19*s.* for 10,156 feet of elm, at 3*d.* per foot; could you purchase that elm at that price?—We were bound in our estimate to desiccate all the stuff and produce a certificate that it was all done, and accordingly, being driven for time in this estimate, being obliged to supply the whole 10,000 boxes in three months, we were obliged to send the elm to the desiccating works all cut into thin stuff; if it had been sent in thick planks it would have taken three months to dry it in, and we sent it cut into 1⅛th-inch boards. We sent some cut first to ¾-inch, and it was completely spoiled; we sent it in 1⅛ inch thick, to enable us to get it in time, and complete the contract; it would not stand as ¾-inch elm; it had afterwards to be reduced to that to enable us to do the work.

6922. What per centage would you think sufficient to cover the waste upon the elm?—In the first instance we had a loss of something like 23 per cent., by reason of having to cut the elm 1¼ inch thick instead of three-quarter; afterwards when we got it home we had to face it and thickness it.

6923. You could not venture to send the elm less than 1⅛ inch thick to be desiccated to come out fit for use?—No; there was a loss independently in the elm itself in cross-cutting; 23 per cent. in the substance of the elm alone.

6924. Will you make a statement of the additions which you think should be made to the 126*l.* 19*s.*, to reduce this elm into the form required for the whole 10,000 boxes?—If we take the first item, which is 10,156 feet of three-quarter elm, at the price, then there is 23 per cent. upon that for the extra thickness; and we would certainly have an allowance for waste in converting it, 20 per cent., which amounts to 25*l.* 7*s.* 9*d.*

6925. Over and above the 23 per cent. allowed by the Ordnance, you find that practically there is a further waste of 20 per cent., which amounts to 25*l.* 7*s.* 9*d.*?—Yes; then we take into consideration the extra labour in facing and thicknessing all that elm that has to be faced and reduced to three-quarter.

6926. You have heard a statement made that it is all to be done in a very short time by machinery?—Yes; ours was done by machinery.

6927. What did it actually cost you to do it?—It could not be possibly done under the price that I have estimated here, amounting to 30*l.* 9*s.*, the extra cost.

6928. Have you been in the habit of doing a great deal of work of that kind?—Yes.

6929. In sawing and facing this work?—Yes.

6930. And you do it by machinery, do you not?—Yes.

6931. You have found that the cost to you would be 6*s.* for what quantity?—At the rate of 6*s.* per 100 feet for facing and thicknessing.

6932. That would amount to 30*l.* 9*s.* extra?—Yes.

6933. Is there any other item?—Then there is three-eighth elm used for the lids.

6934. That is put down in the Ordnance Estimate at 62*l.* 10*s.*?—Yes, but we

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we have the same waste upon that in proportion, being obliged to send it of extra thickness, or it would be rendered useless.

6935. Then there is the same extra labour, is there not?—Yes, we have to convert it just the same, to face it, and to thickness it afterwards; this might be avoided to a great extent if they entered into the contracts in time to send down the planks.

6936. You were required to furnish all the boxes in three months, were you not?—Yes; that was one of the conditions made at the time of taking the order.

6937. The Ordnance estimate being 189 *l.* 9 *s.* for reducing this elm into the state, and cut into the substance required to make the boxes, you show that it would cost you 89 *l.* 16 *s.* 9 *d.* more than the Ordnance have estimated?—Yes; it would be impossible to produce the necessary amount of elm fit for the service under 279 *l.* 5 *s.* 9 *d.*

6938. Now, with regard to the metal, the Ordnance have put down the price of 125 *l.* for metal work: what would that metal work which they require you to put in the box have cost you?—With regard to the net cost of the metal work, first of all, there would be the item of 30,000 screw bolts, nuts, and fly-plates, prepared in Muntz's metal, in two sizes, or two lengths of bolt; these would cost 250 *l.*

6939. At what rate each?—At 2 *d.*; then there are 20,000 toe-pieces prepared in the same metal, at 2 *d.*; that would amount to 166 *l.* 13 *s.* 4 *d.*; making an amount of 416 *l.* 13 *s.* 4 *d.* against 125 *l.*

6940. Are you in the habit of buying brass work?—Yes, and not only that, but there is such a competition for the supply that I obtain the best possible estimate that I can.

6941. Where do you purchase your brass work?—I went direct to Birmingham; I did not have it through any agent.

6942. You inquired there the lowest price, did you not?—Yes, for cash.

6943. You did not go to one person and offer him 2 *d.*, but you applied to a great number of persons?—Yes, I did.

6944. The 437 *l.* 10 *s.*, as estimated by the Board of Ordnance for brass screws and copper nails, you do not object to?—I find it correct, as near as possible, according to what I pay.

6945. The Ordnance do not make those brass screws and copper nails, do they?—No; they purchase them.

6946. When they have to go to market their price is pretty much the same as yours?—Yes.

6947. But in cases where they have to estimate the cost to themselves there is a very large difference?—I brought my estimate rather under the other a few pounds for the copper nails and screws.

6948. What was the cost to you of the rope handles?—The rope handles would cost 135 *l.* 8 *s.* 4 *d.*, reckoning the splicing.

6949. Who made those for you?—We employ persons on our own premises; we keep men who do nothing else but splicing.

6950. Will you state what the cost would be to you of desiccating all this wood according to the requirements of the Ordnance?—There would be, first of all, 50,000 feet supply of three-quarter deal that we should send in of that substance, which, at the least price for desiccating work, would amount to 75 *l.*, and there would be 10,156 feet of 1⅛-inch elm, at 6 *s.*, amounting to 30 *l.* 9 *s.*; 7,500 feet of five-eighth elm, at 4 *s.* 6 *d.*, amounting to 16 *l.* 17 *s.* 6 *d.*; there would be then a heavy item of carriage to and from the desiccating works.

6951. Where are those works?—At Deptford, by the Commercial Docks.

6952. The Ordnance would have to send there and back again as well as you?—Yes.

6953. Their carriage might not be quite as much as yours?—They woul have to come down the Surrey canal; we send direct; we are not so far from the works as they are at Woolwich.

6954. If they sent their timber from Woolwich to be desiccated, they would equally have to pay for it?—Yes.

6955. Do you know whether they perform the process themselves?—They had a large quantity of stuff at the desiccating works at the time that I had mine there.

6956. For the whole of the screws, the toe-pieces, nails, and rope handles, and for desiccating, you estimate the actual cost to you would be 402 *l.* 14 *s.* 10 *d.* more than the Ordnance have estimated?—Yes.

6957. Do

6957. Do you believe that the proprietors of the desiccating works charge two prices?—Not that I am aware of.

6958. Would they do the work for less for the Government than for you?—No; I should think just the other way.

6959. You have stated that you have had some experience in making those boxes, as you have made a large quantity of them; will you tell the Committee the actual price that it has cost you in labour in making the boxes?—Yes; first of all there would be the cutting into those widths 90,000 pieces of timber for the boxes of the exact size; loss on ditto, not fit for the service; in cutting a board, perhaps two or three lengths after they were cut off would be useless by reason of a little shake, which it would be impossible for a man to see before he had cut. A vast number of pieces would have to be cut for that amount of boxes; 90,000 is the net amount, but it would take something like 120,000 pieces; and there would be a great waste in that respect.

6960. What is the amount for that?—It cost me 104 *l.*; we were obliged to superintend the stuff and pick it after it was cut, and mark it before it was cut.

6971. Yet all this was cut by machinery, was it not?—Yes, every atom of it; you must have a person to inspect the board before it goes in, and then to inspect it before it is given into the hands of the men, or half the boxes would be unfit for the service; that would cost 104 *l.* 3 *s.* 4 *d.*

6962. What is the cost of the labour in nailing and putting the box together?—The net cash that I paid for the making of the boxes was 1 *s.* 5 *d.* per box.

6963. Your men worked by piece-work, did they not?—Yes; I found that that was the lowest possible price that they could do them for, to make the article fit for the service, with all the aid of the machinery that was possible.

6964. Do you believe that you apply machinery to as great an extent as machinery is applied in your trade generally?—Yes, I do.

6965. You do not know any other builders who use machinery that you have not got?—There are some who perhaps might employ morticing machines.

6966. My question had reference to all such machinery as could be used in making boxes of this kind?—Undoubtedly.

6967. How much would that make on the 10,000 boxes?—The total cost that I paid on the boxes was 708 *l.* 6 *s.* 8 *d.* Then there is the use of machinery; we had powerful machinery, a 16-horse engine devoted to this work; circular benches and lathes, and drilling machines, and so forth, which I consider would be worth, for the three months, at least 105 *l.*; and then we have the carriage of the boxes to take into consideration.

6968. That is what the Ordnance would not have?—Still we should be entitled to that.

6969. You mean that the amount which you actually pay for labour, using machinery to the fullest extent to which machinery can be used for such purposes, is 957 *l.* 10 *s.* upon the 10,000 boxes?—Yes; the net cash payment would be that.

6970. Against which the Ordnance estimate is 395 *l.* 16 *s.* 8 *d.*?—Yes.

6971. Will you have the goodness to look at that box (*the same was handed to the Witness*); that is a box made by the Ordnance: would they have taken a box such as that from you, with all those knots in it?—I should say that, at first, when I took the former estimate, I sent in I suppose something like 5,000 or 6,000 boxes, I may say almost without a knot in them. I found that I was likely to sustain a heavy loss by that, and I therefore applied to the officers to know whether they would allow me to have a few knots in them, and some of the last boxes had some knots; but I should say that 5,000 or 6,000 were delivered free from knots.

6972. When they applied to you for the 10,000 boxes at that time, you were aware, were you not, that you could send timber with knots in it?—I was not aware that I should be allowed the same privilege. I could not reckon upon it; for instance, all contracts are taken to be equal to the pattern, and if they thought proper they could demand the boxes without a single knot; then, in order to do that, it would be impossible to obtain the stuff at anything like the amount that I have mentioned, because the loss would be so great. In order to obtain 15,000 feet of deal you would require 200,000 or 300,000 feet of deal.

6973. Do you agree with the last witness that the omission of those two toe-pieces is made up for by the extra work in providing a substitute, by cutting away from the top part there (*pointing to the same*)?—I should say that the amount

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amount of the labour in putting on those toe-pieces, and putting in those six screws, is quite adequate to the other; we have to let in these (*pointing to the same*), which are let in very nicely, and exactly to the gauge. Then there are six screws to put in, and two small holes; I should say that this is very intricate; we were bound to make the whole of the 10,000 lids to answer for any box; so that supposing they were mixed together, any lid would suit any box. Not anything like the same nicety is required in this groove.

6974. Then the labour in making your boxes without the cost of the toe-pieces, would be as great as the labour of making this box in the different way in which it is made?—Decidedly, if we take into consideration the letting in the toe-pieces.

6975. Could you buy those toe-pieces at a halfpenny each?—No, it is impossible; they must be made exactly to the gauge at this part (*pointing to the same*); no person could manufacture them for a halfpenny each, independently of the metal.

6976. Would the Ordnance have received from you boxes such as that (*pointing to the same*), as a rule?—No; I should consider not.

6977. If you sent a box like that, you would expect to have it rejected?—Yes; these are pin knots; with a hammer you might drive that knot (*pointing to the same*) right through; they would not reject a sound knot that was thoroughly grafted in the wood, but they would reject such knots as that.

6978. Therefore you must select the material, and not use timber with knots in it like that?—Decidedly; I never sent in a box with knots like that in it; they would not have had it.

6979. You are willing to submit your prices, are you not, to the examination of any person in the trade?—Yes; I am quite prepared to say that any practical man would see them at once to be right and just.

6980. In this work, except for the cutting of the timber, in which you state that you have employed machinery, you have put on no profit in that 6 *s.* 0¾ *d.*?—Not at all.

6981. So that that which the Ordnance state they have made for 3 *s.* 7¼ *d.*, cost you, doing your best, 6 *s.* 0¾ *d*?—Yes.

6982. You use machinery, do you not, to as large an extent as it is used by any person in the building trade?—Yes, quite as much as is necessary. For instance, all the inside planing is done by hand; we thickness this exactly to the gauge by machinery (*describing the same*); what more can be done by machinery? We have a machine to groove this out (*pointing to the same*), to take out that piece.

6983. *Chairman.*] You stated, did you not, that when the Ordnance have to buy for themselves, the prices charged are very much the same as your own prices?—For the metal and for the nails mine is rather under.

6984. You stated, did you not, that you never saw the machinery at Woolwich?—No; I have not seen it applied to this work.

6985. Therefore, what that machinery can do, of course you cannot tell?—I have seen Mr. Anderson's machine, but I have not seen it applied to this particular purpose; I know that they have machines that will thickness a piece of stuff exactly to the gauge, and I can do the same.

6986. Mr. *Geach.*] If any man in your trade had machinery that would do that for 3 *s.* 7 *d.* which costs you 6 *s.*, you would very soon know of it, because he as a competitor would drive you out of the market?—Yes; we have now supplied the Honourable Board with cases for about nine years, and we turn our machinery to the best account that we can.

6987. You have not found generally, so far as you have seen the Government establishments, that they are so superior in the power of production at lower prices, that you have had to imitate them?—I have never had occasion yet.

Mr. *John Evans,* called in; and Examined.

Mr. *J. Evans.*

6988. Mr. *Muntz.*] YOU are a resident in London, are you not?—Yes, in Wardour-street.

6989. Are you a machinist?—An engineer.

6990. You make all kinds of machines, do you not?—Yes, all sorts.

6991. That has been your trade for many years?—I have been in my present house nearly 38 years.

6992. Were

6992. Were you applied to some time ago to make a machine for making compressed bullets?—I was.

6993. By whom?—In July 1851 I was applied to, after I had made one, by Mr. Westley Richards; but I had made one for the Enfield Lock Mills jointly with Mr. George Lovell, a press.

6994. Did Mr. Lovell order you to make it?—I made it under his order; I was paid by the Board of Ordnance, and I delivered it at Enfield.

6995. Did he give you any plan or directions how to make it?—We worked together; we got it up between us; we found very great difficulty in it.

6996. Where was it worked?—At Enfield.

6997. How long did it work there?—I cannot say how long it was kept there; they might have kept it there three or four months. Colonel Dundas sent for it down to the Arsenal at Woolwich.

6998. Did it work there?—It is down there, I believe.

6999. Did it work there?—I do not know; I did not see it at work.

7000. Do you know what kind of bullets were made with it?—I cannot say.

7001. Was it worked by hand?—Yes, by hand; a screw press.

7002. Have you seen the bullet machine which is employed to make them by machinery altogether, at Woolwich?—Yes, once or twice.

7003. Did it work on the same principle as your screw press?—The die and the throwing of the bullet out is precisely the same.

7004. It is put to work by a mill there, is it not?—They have put it to work by a steam engine.

7005. Though the principle may be the same, the machine is not exactly the same?—The machine is not the same; the principle of the die and the forming of the bullet is the same; it is wholly a simple thing; I did expect to have an order for seven or eight of them when I made that first.

7006. Was that expectation held out to you?—My price was so low, upon the calculation that I was to have seven or eight, as being a portable thing to make bullets, to go abroad.

7007. Was that Mr. Lovell's representation to you?—Yes.

7008. What did you get for the machine?—I think 93 *l.* and some odd shillings.

7009. No complaint was made of its inefficiency?—No.

7010. Have you any idea as to the cost of making bullets by it?—I never made enough to ascertain that, because they were so anxious to get the bullets; the moment I finished it Mr. Lovell had a few bullets made, and then he went to France; I was to have an order for more when he came back, but I never did.

7011. You are not competent to give an opinion as to the comparative cost of making bullets by your press, and making them by the present machine?—I am not; I cannot speak about that.

7012. Did you make the bullet out of lead drawn for the purpose?—Yes; out of rolled lead.

7013. Was it rolled of such a size as would work in the press, and make the bullets required?—I do not know where he got the lead; I think it was in the city.

7014. Did you make it from lead in the same way as it is now made at Woolwich?—Precisely the same.

7015. Were the bullets made by your machine as good as those made now? Every bit. I can make as good bullets as they can now; but I could not make the quantity, as a matter of course.

7016. Supposing you had presses enough, you could make any quantity?—I do not know that presses would make them as fast as that machinery does.

7017. You state that you cannot give an opinion as to the comparative cost?—I could not.

7018. How long was it from the time that you first made that machine till the present machine was put up at Woolwich?—I should imagine about two years. Mine was made in the latter part of August, or the beginning of September, 1851; and I rather think that they commenced making the bullets in the beginning of 1853 in the present one.

7019. That machine was sent down from Enfield to Woolwich, was it not, as a groundwork for the present plan?—I cannot answer for that.

7020. Was it ever at work at Woolwich?—I do not know what it was sent

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there for, except that Colonel Dundas wanted to see it, and he had it sent down there.

7021. Is it there now?—Yes, for all I know.

7022. *Chairman.*] How did you propose to supply your press with lead?—I was going to make a little machine to chop them off; just the quantity.

7023. Was that machine made?—No; Mr. Lovell said that I had better wait till he returned from France.

7024. How did you work the die, so as to compress the bullet?—With a screw.

7025. How is it worked in Mr. Anderson's machine?—With a crank motion.

7026. In what way did you regulate the weight of the bullet?—As to the weight of the bullet, we had some difficulty to come at that, till we knew how much the die would do.

7027. How is that regulated in Mr. Anderson's machine?—By measurement of the sizes of the lead.

7028. What provision was there in your machine for ventilating the die, so as to allow the air to pass out and to form a perfect bullet?—I had no ventilation at all; I never required any.

7029. How did you get rid of any superfluous lead?—By judging the quantity.

7030. Do you know how that is done in Mr. Anderson's machine?—Not exactly.

7031. Had you any arrangement for cutting off the burr that would form between the two dies?—I was going to make a die to cut it off, but that was not done.

7032. Was the press liable to bring the bullet out of the die upon the punch?—Not at all; it never did.

7033. You did not consider it liable to do that?—I never found one sticking there.

7034. Do you consider your principle of dies to be as good as any?—I believe there is no difference in them.

7035. You stated that the cost of yours was about 93 *l.*; how many such presses would it require to make 100,000 bullets per day?—I cannot answer that question; I cannot tell; I did not work at it long enough.

7036. Would each press require an able-bodied man to work it?—I do not know that it would, if I made it in my own way instead of making it as it was; Mr. Lovell had it made to please himself, with a fly wheel, which had not half the power that it ought to have; a good-sized boy would have done more than a man, with a good-sized wheel.

7037. How did you put the lead into the die?—As we do copper caps, with the finger, the one that is inside.

7038. Does the press cut off a piece of lead from the pig or rod?—No, it does not; that was not done.

7039. Are Mr. Anderson's dies upon the same principle as yours?—I believe that the die is precisely the same, with the exception that he has small air-holes, I have understood, in the punch; however, my machine made bullets quite as good as the present ones.

7040. Is there any resemblance in Mr. Anderson's machine to your press?—None whatever, except the die, and the throwing of the bullet out of the die.

7041. Has he copied any part of your press or dies?—Not a single thing that I know of.

7042. Mr. *Newdegate.*] You state that no part of this press of yours has been copied?—The dying, and the bringing the bullet out, is precisely the same, upon a stronger principle.

7043. You mean that Mr. Anderson's die and press are exactly on the same principle as yours, only that there is more power applied as a motor?—The die and punch are precisely the same, with this exception; I understand that he has put some air-holes in the punch at the top, otherwise the die and the punch, and the cylinder, to bring the bullets out, are precisely the same.

7044. With a difference, then, in these respects, the principle of the machine erected by Mr. Anderson at Woolwich is the same as yours?—The machine is quite a different thing, with the exception of the die and the cylinder.

7045. The

7045. The principle of the die which you have described is the same principle as yours, is it not?—Yes, certainly.

7046. Does not the difference lie in the power that Mr. Anderson has applied?—Yes, and his mode of putting the lead in it is all most magnificent, correct, and beautiful.

7047. He has added the means of feeding those dies, has he not?—It was not in mine at all, but he has a splendid system.

7048. Mr. Anderson has added a process of feeding the die with lead, has he not?—He has.

7049. That was his own?—Entirely.

7050. He has also added to the principle of your die a process for cutting off?—He has.

7051. Then in the machinery at Woolwich, that which is original is the process of feeding the dies with lead and cutting the lead off?—Yes.

7052. The principle of the die and press is the same principle as yours, is it not?—The principle of the die and the throwing the bullet out of the die, all that is the same, but all the rest is entirely his own.

7053. But that principle is the same as yours?—Yes.

7054. The power applied in your case was hand labour?—Yes, entirely.

7055. In his case it is steam, is it not?—Yes.

7056. Therefore, if I understand you rightly, the actual die and the throwing out of the bullet were originally yours?—The same as mine; mine conjointly with Mr. Lovell; it is as much Mr. Lovell's as mine.

7057. It was a machine that you made under Mr. Lovell's direction?—Yes.

7058. Jointly with him?—Yes.

7059. Then what Mr. Anderson has done is this, he has applied steam power to those presses; he has added the means of feeding the presses with lead, and he has added the means of cutting the lead off?—Yes.

7060. Is it not only a further development of the principle of your press?—Certainly, it is.

7061. Nothing else?—It is a most magnificent thing, and he deserves great credit for so doing.

7062. But it is a further development of the principle of your press?—Certainly, he has extended it very much.

7063. Yours being that press which was made two years ago, with the assistance and under the directions of Mr. Lovell?—Yes.

7064. Mr. *Geach.*] The application of steam to the working of this machine, instead of hand labour, is not a matter of much consequence; that can be readily done, can it not?—The principle that he has adopted is of very great advantage.

7065. It has been stated, that the application of steam to that which was done by hand labour before is a matter of no difficulty, and if it was found desirable to apply steam to your machinery, it might be very easily adapted?—Yes, with a little alteration in it.

7066. Mr. *Muntz.*] Can you give any opinion as to how far there is a great saving in feeding by machinery, instead of feeding by hand?—There is a very great saving in the manner in which this is fed; I imagine so at least. I never stopped long enough to see the quantity that it would do.

7067. The machine may be a very beautiful machine without being an economical machine?—I must be candid enough to say that I never felt pleasant within myself to stop long enough to look at it; I fancied that I was done, in not having others to make; I felt that I was rather ill-used upon it.

7068. In what way?—Not having an order for other presses.

7069. According to that, you thought that yours was the original idea?—Undoubtedly I should have improved mine, as that was improved.

7070. Supposing you had been asked to apply steam power to the working of that machine in the first instance, should you have felt competent to do it?—I cannot answer that question; I have not had the chance to put it to work.

7071. Mr. *Dundas.*] How many bullets can you turn out in an hour from your machine?—I cannot answer that; I never worked for an hour at it, for the moment that it was done it was sent off to Enfield, they hurried me so.

7072. Lord *Seymour.*] Have you invented any machines yourself?—I believe there are two or three of mine down at Enfield; I have made more gun machi-

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nery than any man living; I made pretty nearly the whole that they have at Enfield, at least a great quantity of them; and likewise those at the Tower, in Birmingham.

7073. Have you obtained a patent for any machine that you have made?—Never.

7074. Mr. *Muntz.*] Have you any machinery in hand for the Ordnance now?—Not at present.

7075. What machines have you made for them latterly?—I have got a little machine that ought to have been sent down to Enfield, one that I made for cutting tumblers; one I sent down to the Tower at Birmingham, and the other I understood was for Enfield, but I have not had an order for it yet, for squaring tumblers for cocks.

7076. Have you ever made any other machinery for Mr. Lovell, besides the one for making bullets?—Yes; I made him a rifling machine to rifle the rack, upon a new principle.

7077. Did you ever make any machinery for making gun barrels?—Yes, for turning gun barrels.

7078. Have you ever made any machinery for rolling?—I have sent machinery to Spain for rolling, and to Belgium.

7079. For the Belgian Government?—Mr. Lovell ordered it for a gentleman named Symons, at Liege.

7080. Is it at work there now?—I believe so, and percussion machines likewise, and rifling machines as well.

7081. How long ago was that?—In the beginning of 1851.

7082. When first the rifles came out?—About that time, I believe.

7083. Could you judge according to the machinery that you made what the object of it was?—No.

7084. Whether it was to make rifles, or to make muskets for the line?—I could not tell; I never troubled myself about what they were for; I sent, I think, four machines for turning barrels to Spain, and I think they had three for Liege for turning gun barrels, and three rifling machines.

7085. Upon what plan were the rifling machines made?—Upon a similar principle to the ones they have at Enfield.

7086. Is that the new one at Enfield?—No, the old affair; I had three of them up last summer; I invented one once which the late Mr. Charles Lancaster said was the best gunbarrel turning machine that ever was made; that is kept very secret.

7087. Where is it now?—Mr. Lancaster has got it.

7088. It is a private affair, is it not?—Yes.

7089. Have you never made any but that one?—Never.

7090. It was an invention of Mr. Lancaster's, was it not?—No, it was my own, and I lost a good deal of money by it; I was to have had the honour to show it to anybody, if I could get customers to remunerate me, but the late Mr. Charles Lancaster was rather selfish upon that point, and he would not let any foreigner see it, or else I might have had an order from the Brazilian Government for 10; they were obliged to see the thing in its work, and Mr. Lancaster would not let me show it, and I lost 25,000 *l.* through it; Mr. Lancaster engaged that he would let me show it to anybody I liked, but he refused it, so that I got nothing for it.

7091. Mr. *Newdegate.*] With respect to this barrel-rolling machine that you sent to Belgium, was that upon a similar construction to any machinery in Birmingham?—Pretty well the same.

7092. That was supplied in 1851, was it not?—Yes.

7093. To a firm of the name of Symons?—I believe that was the name.

7094. Is one of the young Mr. Lovells connected with that firm of Symons?—I cannot say; I believe he was then, but I rather think that he has left.

7095. You believe that he was at that time?—Yes, I believe so.

7096. That machinery is similar to the machinery used at Birmingham, is it not?—It is similar.

Mr. *Robert T. Pritchett*, called in; and Examined.

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7097. Lord *Seymour*.] WHAT is your trade?—I am a Gun-maker.

7098. Have you been long in that trade?—My father and my grandfather were before me.

7099. Are you what they call a setter-up?—Yes, for the Government and the East India Company, but we make a great number of private rifles.

7100. Do you employ machinery?—Yes, we do, for boring and rifling, of course; as well as lathes for boring cylinders and barrels in the usual way for rifling.

7101. Is that machinery worked by hand or by steam?—By steam; it is not now worked by steam on account of our being short of work.

7102. You can apply steam to it?—It is best by that.

7103. Have you a system of machinery for rifling barrels?—Yes, either with progressive grooves or plain grooves; it is a system that was patented in 1850.

7104. Did you ever offer your system to the Board of Ordnance?—I have; and if the Committee will allow me I will describe the machine. The machine is a foreign invention, and was patented in France and in Belgium; the patent being taken out in Belgium, a firm of the name of Francotte, at Liege, were licensed to use the two machines upon that principle. Colonel Timmerhaus, the then colonel director of the Royal manufactory at Liege, was shown those machines at work, in confidence; and the colonel returned to the manufactory at Liege, and produced then the 17 rifling machines, on the improved principle, which Colonel Gordon saw when he last visited Liege; an action is now pending against Colonel Timmerhaus for the infringement of that patent. In the year 1851 it was patented in England, and offered to the Board of Ordnance in September 1851; and, if the Committee will allow me, I will read the letter which the Ordnance returned to that offer: "Office of Ordnance, 12th September 1851. Sir,—The Board of Ordnance having had before them your letter, dated the 2d instant, addressed to Mr. Lovell, relative to your invention of a machine for rifling barrels of small arms, I am desired by the Board of Ordnance to apprise you that they have not present occasion for the machine that you offer; but if they should require assistance of the kind at a future time, they will communicate further with you on the subject. I am, Sir, your most obedient and humble servant, *G. Butler*."

7105. Did any one from the Ordnance see the machine?—It was afterwards again offered in 1852; and since that time I showed a barrel cut in it to Mr. Anderson, and Colonel Gordon saw it on the Saturday before he went to Belgium, and Mr. Whitworth, the engineer, saw it, and considered it to be very perfect.

7106. Are the Committee to understand you to say that the machine that was used in Belgium is, you believe, identical with the one that you have?—Precisely.

7107. And that it is of the same pattern, which pattern has been unfairly taken, as you say, by Colonel Timmerhaus?—I believe so; I heard of it before I took it into my hands.

7108. Then this is not an invention of yours, but a French invention?—Yes.

7109. Had you the patent for it in this country?—For my individual use.

7110. Have you had the machine since 1850?—Yes, since Spring 1853.

7111. Have you used the machine in both ways, both for the progressive groove and the plain groove?—I have done so.

7112. You have found it answer perfectly, have you not?—Yes, perfectly.

7113. Have you used it for your private trade, or for any foreign Government?—I have used it entirely for my private trade, and some few foreign orders; my object was, that I saw there were facilities in using the system of machinery, if a great number of arms were wanted, either for the East India Company or for the Board of Ordnance; but since that time, not having supplied any military arms, it has only been worked for my private trade.

7114. Have you applied machinery to any other part of the gun manufacture?—Only for boring the barrel and rifling, and for plainer work with Ryder's cutter for cutting up bullet moulds; not any invention of my own.

7115. You have never applied it to the stock in any way?—No.

7116. Are you aware of the American system of applying machinery to making stocks?—I am aware of it, but I have not seen the process.

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7117. *Chairman.*] Is yours an economical plan of rifling?—I think, if I were doing a number of arms, there is no doubt of it; but I expected that we should have been hard at work before this; of course we have not had an opportunity of putting it to its full test.

7118. So far as you have tried it you have found it answer extremely well, have you not?—For this system of rifling.

7119. Mr. *Newdegate.*] This machine is for rifling with progressive grooves?—Yes, either with or without.

7120. Do you mean that the progressive groove is deeper towards the breech than towards the muzzle?—Yes; deeper towards the breech than at the muzzle; one object of that was this, that when the barrels are light forward, you can have a cut shallower.

7121. So as to admit of lightening the barrel at its muzzle?—Yes; if it is required.

7122. Mr. *Muntz.*] A gentleman was examined before the Committee the other day, who stated distinctly that he had seen a machine of this sort in Belgium, but that there was no such machine in England?—I heard part of Colonel Gordon's evidence the other day, and I believe that that assertion was made, that there was no machine in England; but I believe it was qualified by saying that there was a machine in England; whether he alluded to my own, I cannot tell.

7123. Had he ever seen yours?—He saw mine on the Saturday before he went to Belgium.

7124. Is yours precisely the same as that now used in Belgium?—The difference in its present state, I believe, is, that they work theirs by hand labour.

7125. You work yours by a mill, do you not?—Yes.

7126. Colonel Gordon distinctly stated, did he not, that he saw a rifling machine in Belgium which was very superior to anything that he had seen in this country of the kind, and that there was no such machine at work here?—I believe he did.

7127. He was afterwards asked whether he had seen Deane & Adams' rifling machine?—He saw a barrel cut of mine before he went to Belgium; he saw a barrel cut with progressive grooves.

7128. Did he know that?—I specially explained that to him.

7129. Lord *Seymour.*] Can you state how many barrels you can rifle by your machine, if in full operation, in any given time?—One machine would produce, with good fair work, 123 per week.

7130. Mr. *Muntz.*] How many would you have in the machine at a time?—I only put one now; it could be made to work three or four, if required.

7131. It is merely a question of additional quantity of machinery; if you had a sufficient demand, you might increase the number of machines, and the quantity of work done, to any extent?—We might. The production of the Belgian machine, I have been told, is somewhat less than the produce of this one.

7132. Have you made any experiments as to the advantages or disadvantages of the progressive grooves?—I consider that they are rather an advantage.

7133. Do they shoot further, or more correctly?—It is not a question of distance, because that would involve accuracy. I consider that they are better to produce greater accuracy.

7134. You consider that they are more accurate in firing?—Yes.

7135. Have you tried them against those that were not progressive at similar distances, and in a similar time?—Yes, I have.

7136. You do not know whether that makes any difference in the extent of range?—No. To try that, it would require a range, which is a most difficult thing to obtain under the circumstances in this town.

7137. *Chairman.*] In Question 4398, Colonel Gordon was asked, "Have you never seen machinery used in this country for rifling barrels?" and his answer was, "It does not exist, I believe, except what is brought from France or Belgium;" is that correct?—I think it is a mistake; he saw my machine at work the Saturday previous to his going to Belgium.

7138. Was not your machine brought from France?—Yes.

7139. The next question that he was asked is, "You believe that no machinery exists in this country for rifling?" and his answer is, "No, not to any extent; it may have been tried, but as a fact in practice, no barrels are rifled

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rifled by machinery in England." Then in answer to Question 4567, "You were speaking of the Belgian way of making progressive grooves, and you stated that you did not think that they were made in this country; have you never seen any rifles made in this country with progressive grooves?" he says, "Yes, but not made by machinery; they are made in the most bungling way. There is now machinery for making them in what are called progressive machines; a French invention"?—That is my machine.

7140. Lord *Seymour.*] Can you state whether you supply any foreign Governments largely with arms?—Not lately.

7141. Have you done so at any time?—During my father's time, some years ago.

7142. Mr. *Newdegate.*] I find that Colonel Gordon was asked, "Did you ever try to get progressive grooves made in this country?" his answer was, "Yes; the committee were very anxious to try the system of progressive grooves, which had been stated abroad to be very advantageous, but we could not get them made in this country at all. In rifling, the progressive groove is deeper at the breech than at the muzzle, but it gradually progresses in depth; at the muzzle there is no groove at all, and as it goes to the breech it increases in depth gradually; that is what we call progressive grooves." Were you ever applied to to rifle with progressive grooves for the Ordnance?—I was not; in August I offered to do so, and requested permission to fire at Woolwich, which they declined. If the Committee will allow me, I will read the letter; this is dated the 17th of August 1853: "I am directed by the Master-general and Board of Ordnance to acknowledge the receipt of your letter, dated 11th instant, submitting to their notice your patent method of rifling gun barrels with grooves of a progressive depth; and I am to acquaint you that, as it was some time ago found, from the result of experiments by the committee on small arms, that the unequal rifling of barrels presented no advantages, the Master-general and Board decline to re-open the question by trials of your process."

7143. That process was this very machine for making progressive grooves?—Precisely.

7144. *Chairman.*] Colonel Gordon states in his evidence, that "the committee were very anxious to try the system of progressive grooves;" was that in the year 1852; had you at that time got your machine?—No.

7145. Mr. *Newdegate.*] What was the date of the letter that you wrote?—August 1853.

Mr. *Charles Clark,* called in; and Examined.

Mr. *C. Clark.*

7146. Mr. *Muntz.*] WHAT trade are you?—An Operative Gun-maker, in London.

7147. How many years have you been in the trade?—About 35 years.

7148. What branch of the trade do you work at?—I have worked at various branches lately, at setting up, screwing together, and finishing.

7149. Do you work for one master?—Yes, generally.

7150. For whom do you work?—My last master in the military trade was Mr. Witton.

7151. Upon what guns were you last employed?—Some military guns, that were manufactured by Mr. Witton for Mr. Lancaster.

7152. What sort of guns were they?—I can hardly describe them; they were between a musket and a sporting gun, not fit for either.

7153. What number of guns have passed through your hands in the last ten years?—Upon the average, from 3,000 to 4,000 a year, excepting the last two years, since the slackness.

7154. Eighty a week?—I exceeded that in the two years when such a vast number were made for the East India Company and the Government.

7155. Have you found any difficulty as to viewing?—Very great at one time.

7156. With both the East India Company and the Government?—The Government principally; I had not the same difficulty with the East India Company.

7157. What have been the difficulties that you have met with?—If the Committee will let me, I will begin from what I consider to be the evils of the whole system, for I think that has scarcely been explained. If the Committee wish

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wish to arrive at what are the real evils of the system, I think I ought to begin at the very beginning. I consider that the evils of the system of viewing guns were occasioned by the introduction of Mr. Manton, a West-end gun maker, some 14 years since; Mr. Manton never having, as a West-end maker, been used or having had any experience in the manufacture of military guns, he knew nothing of the necessary parts of a musket, nor does any West-end gun maker; the persons who have the best knowledge are those who are employed in the manufacture, or are in the Government establishments, where they see many thousand guns returned during the year, and they then see the weak points, and see the points of the gun where it really is at fault, and they can remedy them. During the last month there have been many guns returned into store which were made in 1835, and the points that failed in them are readily seen; in five cases out of six it is the barrel, scarcely ever the lock. Mr. Manton having grafted a great deal of fine finish upon the guns, in consequence of having been employed at very high-class gun making, introduced various troublesome jigs and gauges before unknown, and these have caused almost all the evils which have since affected us. After him, succeeded Mr. Lovell, who still followed up Mr. Manton, not only by being inspector, but he introduced one or two of his father's superior workmen; and one of them, Mr. Evans, was afterwards sent down, and is now principal inspector at the Tower in Birmingham. He had been brought up to the best gun making, and he introduced a system of jigs and gauges that ought not to be in any gun of 3 *l.*, and he introduced a very superior description of work. That was the commencement of all the evils that have since affected the viewing of guns, for which the Board of Ordnance has paid immense sums, in consequence of that litigious system of viewing that was introduced by him, and the system has been continued ever since that time.

7158. Was he too severe and particular?—He introduced many rules for viewing muskets which ought not to be; and if they ought, they ought to be viewed not so strictly as they are.

7159. The Committee have been told that you know the state of the trade as respects the quantity of work done; can you give the Committee an account of the number of men employed in the trade in London?—I should say that some five years ago we had from 1,500 to 1,600; perhaps more than that, men and boys, employed; I should say 1,500 or 1,600 men at least. We have on our books an account of some 1,400; and there were many that we had not on our books. We have a number of men on our books of the sick society; we have many enrolled on those books.

7160. Do you consider the Birmingham or the London trade the strongest in men?—At that time the London trade was considerably stronger than the Birmingham trade. The Birmingham trade for all purposes is decidedly stronger, but the London trade was stronger in the manufacture of first-class military guns; we were stronger in setting up the parts.

7161. Many men have now gone out of the trade, have they not?—Many are employed about the docks.

7162. Are they likely to come into the trade again?—They would only be too glad and too anxious to follow their own employment. Men always like the employment best that they have been brought up to.

7163. Can you form any idea as to the number of guns that might be got up in London, in case they were required constantly?—If I was to state my opinion, it might appear extravagant.

7164. I speak of a quality of gun like the Minié rifle; do you know the nature of the work required in that?—Decidedly.

7165. Can you give any idea as to the number of such guns that might be got up in a reasonable time?—Judging from the years 1847 and 1848, I should think that we could get up from 60,000 to 80,000 a year in London; we have set up as many as 50,000 or 60,000 first-class muskets for the East India Company in a year, besides Ordnance work and private work, and consequently we could do it again.

7166. Was the work that you got up at that time of good quality?—Decidedly; and the same class of men that did that could do this.

7167. Have you seen any of those new pistols of Colonel Colt's?—I have taken great pains to understand them.

7168. Did you ever take any of them to pieces?—I have one here; a new one, purchased

purchased last week; and it is his highest class of pistol. This (*pointing to the same*) has been dissected, and it contains 47 pieces. Here is an English pistol (*pointing to the same*) on an improved principle, a revolver, and it contains 31 pieces only; this is Deane & Adams's. The workmanship of Colonel Colt's is of a most inferior description; in fact, it is opposed in the main parts to the leading mechanical principles; in fact, it is almost laughable, the idea of this mainspring (*pointing to the same*). This when striking the nipple loses power; and when you raise it up to this extreme point (*describing the same*) it exerts a power of about eight or nine pounds, and when it falls it falls with about four; the cock is blown back with the power of the explosion; but in the other the cock is stronger on the nipple, losing power as it is raised up.

7169. That is with regard to the principle of the arm, not as to the workmanship?—The workmanship in Colonel Colt's pistol would not bear comparison with any of our Ordnance muskets at all.

7170. Not with the rifles now made?—Certainly not. I mean the inferiority of the lock, as he has adapted the thing entirely to machine purposes.

7171. Have you seen any of Colonel Colt's pistols made?—I have been over the manufactory.

7172. Have you seen the machinery used there?—Yes.

7173. Did you notice to what extent he employed manual labour after he had done with the machines?—I think I can state the exact amount of hand labour that he uses. I should say that it is at least about 50 per cent. I can prove that he has full 50 per cent. of hand labour, and a deal of it a high class of labour; first-rate mechanics.

7174. After the work is got up by the machines, has it to undergo such an extent of manual labour as one-half?—In support of that I need only mention the number of hands; that is quite sufficient to account for it. Our proof-house books here show every pistol that must have passed through his manufactory, and from the number of hands employed there and the number of pistols made, that he must have at least 50 per cent. of hand labour employed, taking into account the cost of them.

7175. Have you ever tried to fit together any pistols of his make?—Yes, that is an error; they will not not reverse or interchange; you cannot get two to do so.

7176. They might be made to do so if you bestowed a sufficient quantity of labour on them?—Yes, if you make the price 15 *l.* instead of 2 *l.* 10 *s.*, but there is no benefit in it. I call the attention of the Committee to some guns that have been returned now lately into store that have been out six or seven years, and I would ask where was the advantage of the work interchanging? There is not one out of several hundreds of them but what the action of the lock is now perfect and fit for service. The barrels, in nine cases out of 10, are the parts injured, not the locks; the barrels are bruised, and more especially in action, the barrel is the principal part that gets injured; that was proved during the last war. Mr. Witton having bought some thousands of the old guns, and many thousands having passed through our hands, we were aware of the nature of the accidents that happened to the guns; we became fully acquainted with them. There was not one lock in 150 that wanted any repairs; therefore the interchanging would positively be of no use.

7177. What part of the barrel is principally injured, the bore part?—Yes.

7178. Were any of them injured by bursting?—Very rarely.

7179. Did the inside give way?—Very frequently the inside went.

7180. Did you ascertain what proportion of stocks were broken?—Upon the average about 10 or 15 per cent. were dangerously broken; a great many, perhaps 60 per cent., of the stocks were broken in a lesser degree and damaged.

7181. Were they broken across the small part of the stock?—Generally about the fore end of the stock, or about the lock; the wood of the lock.

7182. You think that if there was to be a fair and regular system of viewing adopted, there would be no difficulty in making any reasonable number of guns that were required?—I think not; I have not the slightest hesitation in saying that they could be made to any amount.

7183. How long would it require for all the men that have left the trade to return to it again?—By the time that the Honourable Board of Ordnance had got the materials the men would be organised; if the Board said next week, "We have the materials ready," the moment they gave the order the men would

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hear of it, and they would apply to the various masters to know if they were wanted; so that positively before the materials were out the men would be ready for the work. There would be very little stoppage except in the viewing.

7184. Have you ever been at Enfield?—Yes.

7185. Have you ever worked there?—No.

7186. Do you know the place well?—Yes.

7187. Is it in a state of efficiency for work?—I should say decidedly so.

7188. In all respects?—I should say that Enfield is very well managed for the present force of work.

7189. Do you know what they can do there?—I do not. I am happy to say that the view at Enfield has been conducted very much more fairly towards the men than it has been either in London or Birmingham; the men are comparatively comfortable there to what they are here; it has been a perfect hot-bed for the men; the men have scarcely any rest; they can scarcely sleep. I have spent a number of restless nights when I have had the Board of Ordnance work in my hands, almost afraid of my life, lest my fortnight's work should be ruined on account of the view.

7190. Has not that view had the effect of making the men leave the trade?—They are careless, certainly.

7191. Has it not another effect, to make the men charge more for their work?—That system of viewing has enhanced the price of work immensely, and it has cost the Ordnance an immense sum from that very system of view; it has cost them an incalculable sum.

7192. *Chairman.*] Is the view so strict with the East India Company?—No; they having regard only to the soundness of the article, and to the really serviceable parts of it, not to the useless points.

7193. Is the price paid by the East India Company the same as that paid by the Ordnance?—Very similar.

7194. How does it happen that people will not work more cheaply for the East India Company?—We do; we mostly put the Ordnance work on one side if we have the Company's work.

7195. Why do you not charge more for it; you stated that the price of the Ordnance work was very much raised by the strictness of the view?—Decidedly.

7196. You also stated that the view of the East India Company was not excessively strict; I want to know how you reconcile those two things; why the Ordnance view being so strict, the Ordnance work is not dearer than the work of the East India Company?—The East India Company take their prices principally from the Ordnance. The Ordnance set the price first, and the Company take both the pattern and the price from the Ordnance.

7197. Their view being milder their price is not less?—It is not so high in a trifling degree.

7198. Mr. *Newdegate.*] You state that there is a difference in the view between the East India Company and the Ordnance?—There is no difference in the system of viewing.

7199. The view is more fair by the East India Company?—I consider that the judgment exercised by them is better. The viewers of the Board of Ordnance use no judgment of their own; they scarcely dare exercise their own judgment upon guns; they have such stringent rules laid down that it is impossible for them to do so, and I think it is as easy as possible to account for it. I hesitate not to say that throughout these last 10 years, there has been a complete system adopted by the Ordnance servants to drive the English manufacturer out of the market, and by the late Mr. Lovell it was partly avowed. I would mention that in one year his son was appointed inspector of stocks; he died, and that place was never filled up; the second son was appointed, and the place was vacated, and it has not been filled up. A third son was in Belgium, connected with a large barrel house, and we were threatened that the work should be sent to Belgium. This was under Mr. Lovell's management, and I believe there were interested motives in driving us out of the trade.

7200. *Chairman.*] Was the work sent to Belgium?—No; but it was continually held over our backs like a rod.

7201. Mr. *Dundas.*] What object do you think Mr. Lovell could have had in such unworthy conduct?—I have already said, that he said he would reduce the price

price of good men to the very lowest ebb, and that the work should be sent to Belgium.

7202. Was it sent to Belgium?—No.

7203. *Chairman.*] The reason why you think that he was inclined to send it there was, because he had a son there?—I say that there must have been some interested motive.

7204. Mr. *Newdegate.*] You have stated that the view of the East India Company has been less litigious than the view of the Ordnance has been in the last few years?—Yes.

7205. The consequence has been that the supply furnished to the East India Company has been more regular and consistent with the periods assigned to the delivery, than the supply to the Ordnance?—Yes; but the work at Enfield has been delivered; the view has not been litigious there; Mr. Gunner being a very good practical judge, and having been brought up in the trade, he has known well what to reject, and what to take, with judgment.

7206. Are you aware that there were written instructions issued in 1851 to the viewers?—I have understood that they always had written instructions.

7207. To the severity of those written instructions do you attribute a great part of the litigious character of the view?—Yes; a man, however good his judgment or talent as a workman, has scarcely any liberty allowed him; a slight flaw in the barrel, which is really no injury, is rejected.

7208. Do you mean on the outside?—On the inside or the outside, generally; throughout the wood work also.

7209. You have stated that there are certain points not essential to the efficiency or durability of the arm upon which, in your opinion, the view is too severe, as exercised by the Ordnance?—Yes.

7210. What are those points outside the barrel?—Various points which could scarcely be explained, unless I took a parcel of guns that were rejected, and went over them.

7211. But you stated that those were, many of them, points not connected with the efficiency or durability of the arm?—Decidedly not.

7212. Do you know the state of the trade in Birmingham?—I think I am tolerably well acquainted with it.

7213. It has been stated that the workmen in Birmingham work in wretched cellars and garrets; do you think that that is a general characteristic of the workmen who work in the arms trade in Birmingham?—I never heard a more positive falsehood in my life. I am down there several times during the year, and I know some hundreds of them; I have slept in their houses, dined with them, and have eaten different meals with them, and I know hundreds of them intimately.

7214. Have you seen them at work?—Yes.

7215. They do not work in wretched cellars?—It is a positive falsehood.

7216. Mr. *Geach.*] Did you ever see the men work in cellars?—Never; I have never seen it in London; there are but few cellars belonging to the habitations of workmen in Birmingham.

7217. Mr. *Newdegate.*] There are certain jigs and gauges used in viewing a musket; how many of those do you think are useless?—I think they are too numerous; I would instance the percussioning. It is a positive fact that we have to percussion guns to jigs and gauges of the most minute description, but when the Board of Ordnance thought proper to apply machinery, the very guns that they had rejected for our hand labour were immediately taken; the same faults were made by the machinery, and the guns would pass through our hands commonly that would have been condemned if done by hand labour, but they were taken when done by machinery, with a private mark put upon it, to call our attention to it, to be careful.

7218. The percussioning is done by machinery by the Ordnance, is it not?—Yes; and very great delay frequently arises.

7219. You have stated that the severity of the view added to the cost of the musket?—I think so.

7220. And you also stated that the view of the East India Company is not so severe or litigious as that of the Ordnance?—Decidedly not.

7221. Yet the price paid by the East India Company is much the same?—Yes; I liken the Enfield view to the East India Company's view.

7222. As between the East India Company's and the Ordnance view, supposing

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posing the cost to be the same, if the view of the Ordnance was more litigious than that of the East India Company, upon whom did the loss fall; was the loss deducted from the profits of the contractors, or from the wages of the men employed for the Ordnance?—The contractors scarcely got 1 *s.* by the Ordnance gun, and the men were paid badly, and when obliged to work at it they could scarcely get a living; in many instances they could not do it, and they were driven to other work.

7223. When you stated that the cost of the gun was enhanced, you meant that the litigious view diminished unfairly the profits of the contractors and the wages of the workmen employed for the Board of Ordnance?—Decidedly so.

7224. Mr. *Geach.*] You had to work up to the same standard of perfection, that is, you endeavoured to do so, for the East India Company as for the Ordnance?—I believe the guns were as sound.

7225. The only difference was this, that when you were working for the East India Company you, as a reasonable workman, could see what would be likely to be passed and what would not?—Yes.

7226. When you were working for the Ordnance, you could not tell what would be passed?—We were never safe in their hands.

7227. When you had done the best that you could, you had no certainty that the gun would be passed?—We frequently worked all the week hard till Saturday night, and then, in many cases, the guns were thrown upon our hands.

7228. When working for the East India Company, you knew that, if you gave the care and attention which a good workman ought to do, and had skill enough to enable him to do, you had a moral certainty that the things would be passed?—Yes, although the inspectors chosen for the Company are men of exactly the same talent.

7229. The rejections were very few, were they not?—The rejections are as numerous, but not so fatal; there are many rejections on the part of the Company, but we do not mind that if the guns are not condemned.

7230. When you had done your work to your own satisfaction, you might reckon with moderate certainty that the East India Company's inspector would pass it?—Yes, we were satisfied he would not condemn it.

7231. He might reject it, but enable you again to go over some part that he pointed out as defective?—Decidedly.

7232. According to the practice of the trade, you would not like, when a certain standard was to be worked up to, either for the Ordnance or for the East India Company, to tell your master that if he took an order for the Ordnance you would not work for it?—No; we never did that.

7233. If you did so that would be tantamount to leaving the trade?—Yes.

7234. A great many men did that, did they not?—Yes; and in one or two instances the viewers, rather than submit to the rules, resigned their places, and one of the most intelligent men now employed on the "Daily News" actually resigned his situation, rather than punish the men as he was forced to punish them. This gentleman, of the name of Harrington, resigned his situation because his conscience would not allow him to punish the men.

7235. Colonel *Boldero.*] What was the date of your last supply of muskets to the Ordnance?—I do not supply them; I am a working gunmaker for a contractor.

7236. Have you not supplied muskets to the Ordnance?—Only as a workman.

7237. What was the date of your master's last supply?—About 1852 or 1853.

7238. What quantity did he contract for?—The last guns were double carbines.

7239. How many were rejected?—I could not say, only by the books; if we took up 50 guns to the viewer, he rejected possibly 40.

7240. Have you no knowledge whether any of those double-barrelled rifles were condemned?—I think they were a very safe view at the Tower, inasmuch as they had a short fore-end only of wood, and were very strong, and nothing so liable to be broken as in a musket; the barrel edges of the musket are very liable to break, hence it was a safer gun to work at.

7241. You stated just now, that the East India Company paid the same price for their muskets as the Ordnance?—I believe the prices were very similar.

7242. You cannot speak to that as a fact, that they did pay the same price?—I know

I know that they paid within a very trifle of the same price for the journeymen's labour; it was very nearly the same.

7243. Was not it lower?—I never in one instance knew labour that cost 1 *l.* for the Ordnance to be done 2*s.* less for the Company; there might be 1*s.* or 1*s.* 3*d.*, or 1*s.* 6*d.* difference.

7244. You cannot tell the actual difference in the cost of the Ordnance musket and the musket of the East India Company?—I can only speak as to workmanship; I think there might have been 1*s.* in the pound in favour of the Company.

7245. Lord *Seymour.*] You stated, did you not, that the view in London was more severe than at Enfield?—Yes; I have had reason to believe so from the report of men that I have been long associated with.

7246. Are you aware whether the same jigs and gauges are used?—They are made exactly the same; they are counterparts of each other.

7247. When you speak of troublesome jigs and gauges, that would apply equally to Enfield as to London?—Decidedly.

7248. You think not only that the system in London is too severe, but that the system at Enfield is too severe?—No; I think that there was a directing power at Enfield that controlled it with greater wisdom than it was controlled at other places; I believe that a sounder judgment was exercised.

7249. You mean that you do not object to the jigs and gauges, as long as they are used with certain discretion and forbearance?—No; so long as they are used with reason; when you require a jig to fit a cock, for instance, on the cocks of the common military guns, there were 10 or 12 various forms applied that were really useless and unnecessary; I state that to show that I believe that enhanced the price of the gun.

7250. The object of the Ordnance of course is to give the best gun that they can to the soldier?—Yes.

7251. In order to be sure that the parts are all good, and of right proportions, it is necessary to have a system of jigs and gauges?—Decidedly so; or there would not be two guns alike.

7252. Then do you think that there are more jigs and gauges than there ought to be, or that in the use of those jigs and gauges the viewers are unnecessarily severe?—I would not object to the number, if they were not too severe in the application of them.

7253. You think that there ought to be certain latitude as to the degree of fitting in each part to the jigs?—Yes; and I have understood that that latitude has been accorded to the viewers within the last month, and the system has been altered in favour of the workmen in consequence of the restrictions being somewhat relaxed.

7254. What part of the musket have you been chiefly employed upon?—I take the rough stock and finish it, and various parts of it; I worked in Prussia and in France for some considerable time, having been several years on the Continent working for my living in those places; I worked at Liege for a short time, and in Paris.

7255. Did you work for the Government in Paris?—No; I worked for M. Lapage, the gunmaker.

7256. Then in foreign countries you have not been subject to any system of jigs and gauges that you can compare with the English system?—No; but I believe their system is very similar.

7257. Mr. *Newdegate.*] It is not so severe, is it?—I should say not.

7258. As you have been working in Liege, you can speak generally as to the class of workmanship in Liege, employed in the service of the Belgian Government; do you consider that the quality of the workmanship is as high there as that which is required in England?—In the Liege smooth-bore flint musket they were much inferior to the English gun; judging by the best Liege gun that I have seen recently, I think they are improving in the quality of the work.

7259. Do you think that the general quality is as good?—Nothing so good. In fact, the English gun-lock during the late war, as a rule, would always sell for twice as much as a continental-made gun-lock.

7260. Would it sell on the Continent?—Yes; for considerably more than a foreign lock.

7261. Do you think that that difference is diminished now?—I think the Continent has improved lately in their manufacture of muskets.

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7262. Do you think that the workmanship in the English muskets is improved?—Decidedly; we are very superior now to what we were in the old flint gun.

7263. Do you think that the superiority of workmanship and quality still remains with England?—Undoubtedly. As an instance, we export more best guns than all the rest of the world together, both to America and to other parts; the Americans are our best customers for sporting guns.

7264. In America there is a competition between the Continental gun-makers and those of England, is there not?—In America the Government have manufactured a good part of their arms. Last year the Senate appointed a committee to examine into the factories, with a view of reporting as to the necessity of getting all their work up by contract in the shape of competition, and abolishing, to a great extent, the Government factories. That committee last year investigated all the factories throughout America, and their business was to go through America to inquire into them, and then to report to the Senate their opinion, with a view of getting the whole supply by contract. A great portion of their work is now got up by tender, and one or two of the largest gun-makers in America are contractors for the American Government.

7265. Do you know whether that committee has reported?—I have not heard of it; I have heard recently that there was a committee appointed to examine the patent upon this pistol of Colonel Colt's, and that they made a report upon machinery as applicable to this pistol, which I have by me.

7266. What is the substance of it?—Colonel Colt applied for an extension of this patent, and the American Government refused it, and he got a committee appointed; and after that, the committee reported that they found he had lost so immensely by his manufactory in England for making revolving pistols, that it was a constant drain upon the resources of his American manufactory, and that unless they gave him an extension of this patent, he would be entirely ruined by the losses sustained by the English manufactory.

7267. Can you furnish that report to the Committee?—Yes.

7268. Have you reason to believe that it is authentic?—It is reported with the dates, and every thing given.

7269. Mr. *Dundas.*] Have you been in America?—No.

7270. You stated that you had been at Liege?—Yes.

7271. Were you in the Government manufactory there?—No; I was not employed in it.

7272. Have you been in it?—At that time there was very little work got up for the Government, if any.

7273. Did you happen to see the stock-making machinery there?—The first stock machine that I ever saw was introduced into England 20 years ago, an American invention; it was sent over here, a beautiful working model of it, and submitted for purchase right of working it to all the gun-makers here, and it was forwarded from London to Birmingham, and there a very eminent manufacturer, and a very extensive one, brought it into active operation, but he found that the guns that cost him 1 *s.* for stocking by machinery he could do for 7 *d.* and 8 *d.* by hand labour, the waste in that machinery is so very great. This working model we had in Pall Mall, it was in the shop of the elder Mr. Wilkinson at the time; there were pieces of wood of about 18 inches long that were fixed in, and you saw the stock turned and worked.

7274. Yet the loss of material was so great that it was discontinued?—Yes. We have a factory (but I must not mention the name) in England for the manufacture of revolvers, where the vaults and cellars are charged with wasters, and those things are condemned by hundreds that are made by machinery.

7275. As a practical man, is it your opinion that machinery could not be introduced to such a degree as would lessen the price of production, and, at the same time, turn out as good an arm as we have now?—Machinery is introduced most extensively; I believe the Committee hardly have any idea of the amount of machinery that is brought to bear; when you take the barrel being rolled, and the iron turned by machinery, the barrel bored by machinery, and almost entirely produced by machinery; the rod nearly all produced by machinery; the cock assisted, and the lock assisted, by machinery; what part is not assisted? They make the material by machinery, and the only thing is, that the amount of that machinery is not made to appear in one place, but it is in various parts of the town, and seldom seen by strangers.

7276. At the same time, many men who have been in the gun trade have expressed themselves astonished at the machinery which has lately been introduced into this country by Colonel Colt?—If it appears by the report which I shall hand in that the introduction of this machinery into England has shown so great a loss, that it is a constant drain upon the American house, I ask how could English manufacturers introduce machinery that involved a most serious loss?

7277. How many stocking machines were there at Mr. Wilkinson's?—I only saw one.

7278. Was it to make all the different parts of the stock?—I respectfully submit that I said this was a model of the American machine; while it revolved with the barrel in the stock, and shaped the stock to the form of the iron model, it ran also parallel to the parts to be cut.

7279. Those different operations were all performed by one machine?—Yes.

7280. Then that process was quite different from the system that prevails at Springfield, where the stock is made, I think, by 11 or 13 different machines?—Decidedly.

7281. Mr. *Dundas.*] The method that you have described is what is pursued in America; how do you account for the very great loss of material in using this stocking machine?—There will of course be a loss with English walnut. I believe it surpasses human ingenuity to make engines to cut walnut to that very great nicety all over that hand-labour can do. Walnut is a very curious textured wood, and it is not so very readily cut by machinery.

7282. *Chairman.*] You have spoken a great deal about the very vexatious view of the Ordnance; for how many years has it been so extremely vexatious?—I have been entirely employed, or nearly so, on Ordnance work for the last 15 years, and I have ever found it so during the whole of the time.

7283. You stated also that the East India Company found it much easier to get their contracts supplied than the Ordnance; is it the fact that the East India Company got supplied more regularly than the Ordnance before the year 1849, say from 1842 to 1849?—From the year 1842, I believe the East India Company has always found every facility for getting all they asked for.

7284. Did they find greater facility during those years than the Ordnance?—I could not exactly say what facility the Ordnance had for getting arms in 1842.

7285. Are you aware that the Ordnance got a very large supply indeed, both in London and in Birmingham, during those years?—I believe they did, but I think it was partly attributable to the barrels and locks being made; they had them in store since the war, and they were merely slightly altered; that supply had no reference to the whole supply of materials.

7286. Do you mean to say that the great portion of the work done for the Ordnance in London during those years, was only that which you have now described, namely, altering the old materials?—No, what was set up then was new work entirely.

7287. Did the Board of Ordnance find more difficulty in getting that new work done in those years that I have specified, than the East India Company did in getting new work done during the same years?—I believe their work was not delivered so regularly.

7288. Did they get as many guns in the year?—That I must leave the Committee to judge of. I have no reports upon the subject.

7289. At all events, you consider that during that time the view was of that vexatious character of which you have complained?—It has been from 1842 upwards.

7290. Mr. *Newdegate.*] Have you not heard more complaints of the severity of the view between the year 1851 and the present time, than before?—Since the new line gun has been made, there certainly has been room for greater complaints; they have been more troublesome to view, since the new line gun was made.

7291. *Chairman.*] That was in 1841?—I think that the first were made about that time.

7292. Mr. *Newdegate.*] But during the last 12 years has the view been more litigious at one time than at another, and when was it most difficult?—I could not say that it was irregular at all; the severity was always alike, I think, during that time.

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7293. Do you think that the view has not been more severe during the last three years?—I think not; we had about the same difficulties to contend against.

7294. *Chairman.*] You stated, did you not, that the number of men in London in the gun trade, something like four or five years ago, when there was a great supply required for both the East India Company and the Ordnance, was about 1,500?—Yes.

7295. You were asked whether you conceived that there were so many men now in the trade?—If you take the deaths in a period of five years at about 10 or 15 per cent., deducting them, I think you would find the same number of men to rally round the contractors after a very few weeks.

7296. That is what you consider to be somewhere about the strength of the London gun trade, between 1,300 and 1,400?—I think they could be brought together again.

7297. And with those men you consider it possible to make 50,000 muskets in a year?—I should be most happy to show you the calculation by which I could prove that the same number of men could furnish a much larger amount, for this reason, that we had foreign orders at that time which we have not now; and we were executing those orders at the same time.

7298. The whole of the materials would have to come from Birmingham, would they not?—Not the whole, certainly.

7299. What proportion of them would not?—We had many lock-makers in London at that time.

7300. Are there many now?—I am sorry to say, and I think it is right I should mention this circumstance with regard to those lock-makers; I will explain that point. We had several lock-makers, and among them was one who got up work very largely, and he has lately left for Australia under painful circumstances, having accepted bills to a large amount for a son of the late inspector, Mr. Lovell, and not being able to meet them, he was obliged to abscond, leaving his debts unpaid. I mention that in support of my former observation, that those transactions did occur, which showed interested motives.

7301. How long ago did that occur?—The man has left somewhere about 12 months.

7302. How long ago is it since those bills were accepted?—I have heard some two or three years.

7303. Have you any objection to name the person who is gone to Australia?—Mr. Davis.

7304. Mr. *Geach.*] As a workman, you have no objection to the application of machinery to purposes where hand labour had been applied before, where it can be done more beneficially?—I think that I must be a very great enemy to my country if I did object to it; I have no objection.

7305. In your experience, have you seen the continued substitution of machinery for hand labour, so that in many cases where hand labour was found to do a thing, machinery was invented to do it better and cheaper?—All the people that I have alluded to thought it a benefit to the country.

7306. It does not follow because you can invent machinery to do a thing, that necessarily, because a machine is invented, it will supersede hand labour?—I should put down a man, as a merchant, as unfit for the business that he carried on if he involved a large capital in the entire invention of machinery the action of which he knew nothing about; but that man would be a wise man who would let machinery come gradually into operation; and it is the plan here to let it come gradually into operation.

7307. You find in the gun trade that machinery has been applied to a large extent?—It is now, at this time.

7308. You believe that machinery would do what is done by hand labour to a much larger extent, supposing that there was in this country, the same as in other trades, a large and steady demand?—It is in the nature of things, as the demand increases that it should be so.

7309. When it was found that by machinery a thing could be done better and cheaper, that machinery would be introduced?—I believe that the private trade of England has ever been active to do such things.

7310. It has not been found necessary for the Government first of all to make the experiment?—I am sorry to say that I could name many instances in which they have spent vast sums of money, and the thing has turned out a total failure; they purchased an American sawing machine some years ago, that was a total

a total failure in America; and it was considered the only good thing that the man ever did in his life was inventing a sawing machine and selling it to the English Government. Mr. C. Clark. 5 April 1854.

7311. *Chairman.*] What department of the Government was that sold to?—I cannot tell.

7312. Do you know what year it was in?—The Committee will have that evidence before them.

Jovis, 6° die Aprilis, 1854.

MEMBERS PRESENT.

Mr. Monsell.	Colonel Boldero.
Mr. Muntz.	Mr. Newdegate.
Lord Seymour.	Mr. G. Dundas.
Colonel Dunne.	Mr. Geach.

WILLIAM MONSELL, Esq., IN THE CHAIR.

Mr. *Charles Clark*, called in; and further Examined.

7313. Mr. *Muntz.*] IN your evidence yesterday, you stated that you had some double guns returned that were condemned; what was done with them?—We had, I find, on reference to my books last night, some 18 or 20, after they were condemned by the Board of Ordnance, I think in the year 1852. Mr. C. Clark. 6 April 1854.

7314. *Chairman.*] Do you remember the month?—There was but one order of the kind out; I think there were about 20 came into my hands condemned, as near that as possible; and after they were condemned by the Government authorities, Mr. Witton, my employer, having an order from Mr. Lancaster for double-barrelled carbines for officers, we fitted the new double-barrels and locks into some of the condemned stocks, and made them for Mr. Lancaster, and they were sent to the officers going to the Cape, and considered sufficiently good for the officers, though condemned for the men?—They went out, and were really excellent, serviceable, and good guns; so good that it would have puzzled any man to find fault with them in the shape of a break; they were not broken guns, though condemned.

7315. Mr. *Muntz.*] What was the nature of the complaint made against them when they were first refused?—It might be such a complaint as I will here show. I have heard repeated reference to jigs and gauges, but I have seen none produced. I have produced here two specimens of condemned cocks, and three specimens are musket cocks; here is a broken one, and here are various gauges for jigging those cocks (*pointing to the same*). As a practical man, I say that human ingenuity could not devise by any means a more litigious system of viewing a military cock; there is not a spot where you can place a pin in that cock, but what there is a steel gauge to fit. Here are two cocks (*pointing to the same*) not only rejected, but destroyed; so that the manufacturer is not only mulcted in the expense of the new cocks, but they are rendered unserviceable by the way in which the inspector marks them, by putting a file through them.

7316. *Chairman.*] Have those been returned or condemned?—Condemned. This was condemned with a notch through it, simply because it is scarcely so wide as the gauge, and it does not quite fit the gauge (*explaining the same to the Committee*). There is a gauge there, and here is a gauge by which a man must file to the greatest nicety round there; here is also a gauge at the back, and it must fit completely round there (*explaining the same*), and you have a gauge upon it there (*pointing to the same*). Every spot of the cock that you mention is subjected to those gauges. An instance never was seen, I think, of a cock to break across the thick part here; and because the gauge slips slightly over this, the cock was destroyed for all useful purposes, and the workman had to pay for another simply because the gauge slips rather lightly over there.

7317. Who was the viewer in this case?—I cannot name him; this took place on the line order; this was not peculiar to one viewer; all the viewers were

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labouring under those instructions; it is the system that I complain of, not the viewer.

7318. Lord *Seymour.*] This of which you complain was not any caprice of the viewer?—None whatever; I make no complaints against the viewer, but the system.

7319. You have shown that one of these cocks is too narrow?—I have placed the gauge on to show how little it is too narrow.

7320. You have shown how small the difference is from the size required?—Yes.

7321. But it is of great importance that that should be sufficient, so that it may not slip in the soldier's hand?—Decidedly it is; it should be something near the mark; but I submit whether a man is to be punished for that very little difference between the actual gauge and that cock; I have not shown hardly half of the gauges; this is another gauge (*pointing to the same*), and there is not a spot on which you can place a pin but what there are steel gauges for the workman to place, and he gets a miserable sum for the labour that he has to perform.

7322. Are not the same gauges used by the East India Company?—Yes; the same gauges are in existence, but they are not carried out so litigiously; they are in existence, but they are scarcely ever seen. Those gauges were applied to this description of cocks previously to the introduction of machinery for partly manufacturing the cock; but so soon as the Board of Ordnance introduced machinery for forwarding the nose of the cock, and putting it on themselves (the price of the material was lowered for the very express purpose of showing that machinery was cheap), then the strictness of the gauge was abolished, and we had views viewed by sight as they ought to be, or nearly so viewed by the eye; they were then, after the introduction of this machinery for cupping out the nose, viewed by sight. And before, when the men filed them all, there were those gauges, and I only submit to the Committee that I name those things hearing that machinery is about to be established for that purpose; so sure as it is, so sure the evils that we are subjected to in the viewing will be abolished when machinery comes into operation. Hence I ask the Committee to give the workmen a trial under a more improved system of viewing before they condemn the workmen. I can show the Committee hundreds of men now who would be too anxious to work, almost pining away in want with nothing to do, in a miserable state of existence. Again, with regard to the gauges, here is one (*pointing to the same*). This is the first gauge that the lock is subjected to: it is a beautifully made iron gauge, and with reference to interchanging, I would ask if any American, or any other country's locks, can be put to a nicer gauge than in England; that is an iron block, all fitting tight; the lock is placed in there (*explaining the same*), and the viewer turns it round, and he looks to see that every part of the work fits; hundreds of locks have I seen put on to wrong guns. I mention that to show that our work fits as well as the American; I have seen a number of barrels fitted to stocks that they never did belong to, put in by accident, such is the nicety of the work; no plan of viewing can surpass this.

7323. You do not object to this system of viewing?—Not in the least, if you allow us the slightest latitude; would it affect the service if this plate did not fit to a hair, there or here (*pointing to the same*)?

7324. If it did not affect the service, if it does not drop in exactly, it allows a discretion to the viewer?—That is what I ask.

7325. Then that discretion may be used sometimes in favour of, and sometimes unfavourably to a man?—I think the viewer, who is a man that understands his business, and they are selected in all cases from men who understand their business, would be able to draw the line without injury to the Board, or to the man.

7326. You would not be afraid of any favouritism on the part of a viewer being shown to one workman against another?—I have no charge whatever of the kind to make against them; I have had a great deal of experience in viewing guns, many thousands; it is the system.

7327. Mr. *Dundas.*] Is it usually the custom with the viewer to spoil work which is too small for the gauge?—They have done so.

7328. Without giving any compensation to the workman?—Not the slightest.

7329. Colonel *Boldero.*] Most of the witnesses engaged in the gun trade who have

have given evidence upon the present system of viewing, have expressed themselves satisfied with it; do you agree with them?—I will give my reasons for introducing these; it is because they have not had a sufficient supply at the Ordnance, because they could not get it; I bring this to show that we have been prevented from giving them that supply which we could otherwise have given, had we had a different system of inspection.

7330. Mr. *Dundas.*] Is each workman furnished with a gauge as he proceeds with his work?—Decidedly; he must buy them at his own expense, or make them, and they are marked with the Government mark.

7331. Such a gauge as you have produced, has he also to furnish that?—Every man who makes a lock has to find one of them; he could not work without it; his tools cost him a considerable sum of money, and the man who makes that lock (*pointing to the same*) is a skilled mechanic.

7332. Mr. *Newdegate.*] Is it not the fact that you may gauge up to any price?—Yes.

7333. It is only a matter of degree between the work of a chronometer and the work of a musket lock?—Exactly so.

7334. And therefore, unless a discretion is left to the viewer, and that is fairly exercised, it is impossible for you to work at the price?—Impossible.

7335. Do not you think that if some arbiter were appointed to act in cases of alleged litigious view, that would be an advantage to the trade?—In all probability, though I must observe that we had one in Mr. Lovell; he was an arbiter, but the great misfortune with him was, that he was not a mechanic, and he had no practical knowledge; again, Mr. Lovell assisted in establishing the very system against which I complain, consequently it would be appealing with scarcely any hope of redress in this case.

7336. I do not mean a person like Mr. Lovell, who is an officer concerned for the customers of the trade, but I mean an impartial and independent person well acquainted with all the details of the gun trade?—I think decidedly it would be beneficial for us to have a court of appeal, but we have it now in Birmingham. I speak of a gentleman to whom we could appeal, recently appointed, namely, Mr. Gunner.

7337. But might not an opportunity of appeal to a competent and an impartial arbiter in many cases correct abuses on the part of the viewers, and at the same time tend to improve the general working of the men?—I cannot really see anything against the appointment of such a person.

7338. Mr. *Muntz.*] Always supposing that he was a real workman?—Decidedly. But above all things to be careful that the man that is appointed has been brought up in a proper school, not as a best gunmaker, but as a military gunmaker, and that he should not graft upon the military gun the sporting system, or the system of working up to the beauty of sporting guns.

7339. Mr. *Newdegate.*] You mean this, do you not, that the arbiter should be a person acquainted with the making of military guns, that is, of efficient arms with sufficient finish for military purposes?—Decidedly so.

7340. Colonel *Dunne.*] What is the course pursued by the London gunmakers when they get a contract; is it not to meet and decide upon the prices?—If the Board gave out work to a master contractor, the first step that the contractor would take would be to call his men together and say, "Here is an order to supply a lock to that pattern, and we shall be able to give you so much for doing it." That is the commencement of the bargain between the contractor and his men.

7341. Was a list given in 1852 by the gunmakers in London of the prices that were thought fair?—Yes.

7342. Was it not afterwards altered by the gunmakers, and were not the prices raised subsequently?—I am only here as a working gunmaker; what the masters did I do not know, neither can I answer the question as to what my employers did.

7343. Did not they meet and raise the prices that were at first proposed?—Not to my knowledge, although intimately connected with the whole affair.

7344. Was there no combination among the workmen?—Most decidedly there was.

7345. Did not that combination tend to raise the prices, and place the Ordnance in a difficulty?—Most decidedly not.

7346. Do not you think that raising the prices by combination must place the

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the Ordnance, or any person who requires arms, in a difficulty?—With all due respect, I will defy the history of the gun trade for 40 years to prove an instance in which the gunmakers demanded an increase of price for any order that we had; we have invariably submitted to a reduction of the prices, and that has been the cause of disputes, but we never asked for an advance when we had orders that went on progressively; we dropped our prices, but we never advanced them.

7347. Did you never hear that the employers complained of that combination as a reason for not going on with their contracts with the Ordnance?—The only complaint that any one contractor could have made in that case was simply that the men were not disposed to allow him a shop rent, a practice which was introduced at the time.

7348. Do you know the firm of Holland & Sons?—Yes.

7349. Are you aware that they had a contract about that time?—I am, perfectly.

7350. Are you aware that they gave it up?—Yes.

7351. Are you aware of the reasons why they gave it up?—Yes, perfectly.

7352. Will you state them?—The reasons were these, that they had taken it at too a low figure, lower than they found would offer them a profit, and consequently they threw it up.

7353. Was that the reason assigned to the Ordnance for giving it up?—I cannot tell that; a man may sometimes assign a reason which is really not true.

7354. If they stated that they did it in consequence of a conspiracy and combination among the workmen, and others, in London and Birmingham, would you agree that that was the case?—I will deny that. It was the fact that Messrs. Holland at that time had a contract for Minié muskets, and Messrs. Holland wanted the men to allow them so much for their stand in the shop where they worked, but the men never having heard of such a thing in London as to allow an employer 1*s.* for his place that he worked in, refused to allow him that 1*s.*; and as that very money would have been the profit that Mr. Holland would have got upon the gun, not being able to get that profit he threw up the contract. But there were other motives, that never appeared upon the face of it, which caused Mr. Holland to throw it up.

7355. Therefore the breach of contract was not owing to the workmen, but to Mr. Holland himself?—I think so. I submit again that there never had been, for 40 years, what is termed a strike in the gun trade at all, and I will defy any man to prove that there has ever been a strike in the gun trade at all. I will simply explain that: a strike I consider to consist of, or to act in this way; if a lot of men undertake to work at a gun, 20,000 being given out, at a certain price, they fulfil that contract; the Honourable Board then gives out another pattern, and I say that the men are at perfect liberty to make a fresh contract as to the price of that gun; but no man ever knew, when gunmakers had proceeded part of the way with a contract, that they have turned round and said, "We will have more money now." Stoppages have taken place when they have had to make a fresh contract for a different description of gun; the Board had so many patterns at that time that we had frequent cause to make fresh agreements with our employers. There were eight or 10 different pattern guns in two or three years; the percussion guns we were not used to, but there were not strikes in any case.

7356. I will read you a letter from Messrs. Holland, as it is desirable that the Government should know where the blame really lay, whether among the workmen or among the contractors; it is dated on the 18th of March 1852, and it is to the following effect: "Referring to your letter of this day, requesting my attendance to sign the contract for setting up the new rifle musket, I beg respectfully to state, that in consequence of a conspiracy and combination of the workmen and others in London and Birmingham, which combination has caused the London workmen to advance their list of prices, dated the 10th January, demanding an advance of 16¼ per cent., as the enclosed list will prove. In consequence of the unjust demands of the workmen I cannot execute my contract, except at a loss, therefore I should feel thankful to the Honourable Board if they would consent to relieve me from the execution of the same, being convinced that such a course would be a means of breaking up this combination, and of preventing further unjust demands, and also a benefit to the public service. I may add that my price for setting up the muskets at 23*s.* 5*d.* was given in consequence of my workmen having agreed with me to work at the prices named

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in the list of the 10th January." In your opinion, was that borne out by the fact of a combination among the workmen?—I am not at all aware of those facts, although at that time I was a party to the arrangement of the prices for other contractors. I was aware when they asked us the price that we would take for our labour that all the other contractors had tendered; and I should explain, that Mr. Holland not only had a difference with his men, but he had a difference with all the contractors in the trade.

7357. There was a meeting which purported to be of the workmen themselves on the 18th of March 1852: "I hereby certify that J. Bowler, junior, has this day communicated to me that a resolution to the following effect was unanimously agreed to at a meeting of the trade held yesterday: That unless George Harris, a finisher, now in the employ of Mr. Holland, be discharged, they, the operative gunmakers, will not work for or serve Mr. Holland in any way whatever; and, further, that the same J. Bowler recommended me to write to the secretary stating that I will not work under the prices now demanded, in order that the above resolution may be withdrawn." This is signed "George Harris, his mark." Was not that a combination of workmen to prevent Mr. Holland performing his contract?—I boldly state that there is not one word of truth in that letter, having myself been present at every meeting of the men; it is a subterfuge to throw up the contract.

7358. I hold in my hand a letter from Birmingham dated the 22d of March, about the same time: "It is with much regret that we have to inform you that we are at present unable to proceed with the setting up of the new rifled muskets, in consequence of our workmen now refusing to work at the prices agreed upon between us previously to our settling the price with the Honourable Board; we desire to state we are willing to pay the prices fixed in their list of the 10th January last, and which are the same as paid to them in 1849 for the new line musket, and which they on several subsequent occasions have declared to be fair and reasonable"?—That is a most unfair accusation on the part of Messrs. Tipping and Lawden; I do not hesitate to say that there are contractors here who know that it is not true; that the line musket has no comparison with the gun then about to be set up, the Minié; a sight was placed on it, which gave the men a great deal more trouble; a comparison between the line musket set up and that gun is most unfair.

7359. Mr. *Newdegate.*] Do you mean that the prices which had been agreed upon between Messrs. Tipping and Lawden and their men, were prices for the line musket, and not for the Minié rifle?—Yes; gentlemen here know that there ought not to be a comparison made between the line musket and that Minié rifle.

7360. Colonel *Dunne.*] Are you not aware that the prices that were fixed on the 10th of January, and sent in to the Board by the contractors, were asserted to be agreed upon by the workmen for the Minié rifle; all the questions that I have asked you having reference to the Minié musket?—I deny that the men in London or Birmingham, with whom there was an understanding, when they once gave their employers a price enabling their employers to tender, ever raised or altered that price.

7361. I will read further: "We feel quite convinced that if we were to comply with their present demands we should impede rather than facilitate the supply of arms. We have reason to believe that the workmen have an impression on their minds that, unless they obtain the advanced prices, they will not be able to get their work passed in the view rooms without difficulty. We would beg respectfully to suggest that if a resident officer could be appointed in Birmingham, competent to decide any dispute between contractors and viewers, and workmen and viewers, such officer would be a great benefit to the public service, and would, in all probability, have prevented the present unhappy dispute between ourselves and workmen. We beg to state our decided opinion that the workmen would have been satisfied with the arrangements entered into between us previously to our settling the prices with the Honourable Board, had it not been for the influence exercised over them by other parties; and we know that the gunmakers whose tender for the setting up of these arms were not accepted by the Honourable Board (and who are aware that we are limited to time in the execution of the contracts) have used every means in their power to induce the workmen to hold out against us, and have signed a document for the workmen within the last few days, stating that their demands were fair and equitable, although the workmen have admitted the prices we offer for the labour we require

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require from them to be fair and reasonable. We now most respectfully have to ask that the Honourable Board will allow the prices paid to the workmen at Enfield for stocking, screwing, and finishing the new rifled musket, to be posted in the view rooms, as we believe it would be a benefit to the public service. We beg most respectfully to request that the Honourable Board will be pleased to extend the time for setting up these muskets beyond the time named in our contracts." This is signed by Messrs. Tipping and Lawden?—There is one essential point in this letter which I wish to explain more than any other, which is this: the Committee will understand that we always take with infinite satisfaction our price from the price paid at Enfield, and there is not an instance in which we asked one single farthing more in any one branch of the gun than they paid at the Government manufactory; we considered that the Government were the proper and competent authorities to judge under their own eyes at Enfield as to the price necessary to be paid, and in no one case did the men either in Birmingham or in London ever ask one farthing more. I trust that answer is satisfactory.

7362. *Chairman.*] Were the men in London and Birmingham at that time in communication together?—I must say that we were.

7363. Did you go down to Birmingham at the time, with reference to this contract?—I have been down to Birmingham several times to come to an understanding with the Birmingham men, so as to cause no strike or stoppage. We have arranged as to the price, but that was always beneficial, not tending to strikes; it was merely a contract between the employers and the employed upon the musket about to be set up, which might have been the established price for years.

7364. Lord *Seymour.*] You stated, did you not, that when the workmen had once entered upon work which had been tendered for, they never altered their price during the progress of that work?—Never in one instance.

7365. Colonel *Boldero.*] Is there a union of gunmakers in London and Birmingham now in existence?—Not the slightest in the world.

7366. Is there no union of gunmakers in London?—No, not even a society, nor even books; if an order was given to-morrow morning for 60,000 muskets, the men would call a meeting and examine the gun, and debate among themselves as to the amount of work to be performed, and what was a fair and equitable price, and they would immediately communicate with the masters what their opinion was; then the question comes fairly on the carpet between the masters and the men as to what price shall be paid, and in most cases that has been decided quietly, without any trouble to the Board.

7367. How do you reconcile your last statement with the previous one, that the workmen were always contented and satisfied if they obtained the same prices as at Enfield?—We meet for that purpose; it will take several meetings to ascertain and dissect the prices paid at Enfield, and to get at them we used to go, and when we got them, in most instances they were accepted. I have books of prices, which I can compare with the Government prices at Enfield, and show that in no instance did we exceed them.

7368. Are you prepared to say that in no instance you demanded a higher price than was paid in Enfield?—In no one instance, in my memory.

7369. You have never thwarted the Board of Ordnance by asking higher prices?—Never, but we always took them invariably; and further than that, during several Boards, or one or two Boards, we had the Enfield prices pasted on the Tower doors, and we never grumbled, but worked for the same.

7370. Colonel *Dunne.*] I hold in my hand a letter from Messrs. Hollis and Sheath, which I will read to you. "Birmingham, 30th March 1852,—Sir, In consequence of the great opposition we are now subjected to, on account of the workmen holding a document, signed by a number of gunmakers whose tenders were not accepted (most of whom have been employed on former orders by the Honourable Board), declaring the advanced prices demanded by the workmen to be fair and equitable; and further, that many of our workmen inform us, that unless the advanced prices are paid for the rifle muskets, they will not be able to get the work passed view without great difficulty, we fear we cannot execute our orders by March 1853, unless we pay the advance prices demanded. We therefore beg respectfully to request that the Honourable Board will be pleased to grant to us such an extension of time, as will be sufficient for us to break down this combination of masters and workmen to raise prices unjustly and injurious

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to the public service. We beg to add, the prices we have offered for the workmanship are the same as demanded by the workmen in their list of March 1851, and 10th January 1852, and the same as paid to them in 1849, which prices were then and are still considered just and reasonable, and would be satisfactory to the workmen now, if they were not influenced by the gunmakers who signed the document above named. If the Honourable Board can allow us an extension of time, and would allow us to return into store the materials we have already received until the workmen are ready to take out the work at the prices paid in 1849, we believe this would be a means of causing the workmen to go to work sooner than if the material remained in our warehouses. At the same time, we beg to state our willingness to proceed at once with the work, and fulfil all our engagements to the Honourable Board at the prices demanded, if desired to do so; but we feel quite confident, if we give way to the workmen in the present instance, it will be proving our weakness, and open the way to further and greater advances, which would be extremely detrimental to the public service in case of further supplies being required. We beg to be allowed to suggest a proposition by which we could set up our present order for 23,000 rifled muskets, at a saving to the Honourable Board on our present prices of 1,150*l.*, if our proposition can be entertained." Now that letter was followed by this on the 19th of October: "Referring to our letter of the 18th instant, we beg to state our reasons for asking the Board to divide our present order for new rifle muskets on our individual account, are the greater facilities we should have for increasing our number of workmen. To make this more clearly understood, we enclose a copy of a resolution agreed to at a special meeting of the operatives; this resolution has been strictly carried into effect, and is the great evil under which we are now suffering. We intend, if the Honourable Board will sanction the proposition in our letter of the 18th instant, to divide the workmen in our employ; Mr. Hollis will retain one portion, and Mr. Sheath will take the other; each party will then make arrangements with his workmen for a term, say two or three years, and apprentices must be engaged to work under these workmen; by these means each of us will have a staff of workmen to meet the demands made upon us. We cannot induce workmen to take upon themselves the responsibility of articled assistants and apprentices, consequently we shall be compelled to take these risks upon ourselves, which we are willing to do as far as we are individually concerned. The above is the only plan we have for increasing our staff of workmen, and can only be effectually carried out (without great opposition from the operatives) by each party having separate premises, and a separate trade." They enclose a decision which was come to at a special general meeting of the operative gunmakers held at Mrs. Gray's, the Fox and Dogs, Princep-street, Birmingham, on the 13th of April 1852?—Am I to reply to a document, the foundation of which is not in fact?

7371. Will you be good enough to state whether what I have read are facts or not?—I sit here in the face of the very writers of those letters, and I tell them that the comparison is most unjust and unfair, and to answer their own selfish purposes it must be. Here is a letter making a comparison between the line gun of 1842, and the rifle gun of 1853, when they well knew that the work was different, and the sight materially different. Here you have an improved Minié musket compared with the line musket, and I ask if the very outset of that letter is fair. If it is fair, I will answer the other parts of it; but if it is not fair, I have no right to reply to the other parts of it.

7372. I hold in my hand a document purporting to be agreed to "at a special general meeting of the Operative Gunmakers' Society, held at Mrs. Gray's, the Fox and Dogs, Princep-street, Birmingham, on Thursday, 15th April 1852." It says, "That in consequence of the large increase of the workmen which has taken place during the last few years, which increase has raised the amount of labour considerably above the demand, we deem it prudent to adopt some regulations to counteract the growing evil of admitting fresh hands into the trade without some restrictions. We therefore mutually agree that no stocker, screwer together, or finisher shall employ more than one assistant, which assistant shall be apprenticed or articled till they are 21 years of age, only such to be apprenticed or articled as are already in the trade; all agreements to be submitted to the inspection of the Committee, and subject to their approval. Errand boys under 14 years of age, and screwers together receiving full prices for their work, not considered assistants; parties above 20 years of age,

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who have been in the trade for a term of three years, to be articled for a term of not less than two years. The co-operation of every workman in carrying out the above resolution is earnestly requested by yours respectfully, *The Committee.*" These communications were received by the Ordnance, and the Ordnance were under the impression that this combination existed among the workmen, and it is very desirable that the truth should be cleared up?—I am very much afraid, that in explaining I should almost tire you; this I am not answerable for. I am a London workman, and no combination of this kind ever entered the brains of the London men, neither were they parties to it. In reference to that letter, the very contrast is an unfair comparison; and again it appears to me that that letter is a sort of asking the Board to assign over to some three or four contractors a parcel of men, to dole them out, some to one, and some to the other, the same as you might sheep or pigs. Hollis is to have so many, and Turner so many men assigned to them, and the Board is to assist them in this; and, I ask, is that a fair method of dealing with the English mechanic?

7373. I did not say that the Board had assented to this?—No. But is the proposition, with every respect to the Honourable Board, a fair one, to ask the Board to step in? And again, I submit, that had these four contractors shown that they were having 27 *s.* for setting up the gun, and the men wanted out of that wages amounting to 26 *s.* or to 25 *s.*, they would have had a strong case. If they had shown that the price would not allow them to get a fair profit, or if they had shown that we had demanded so much that they could not get a fair return for their capital, they would have had a straightforward case; but they did not come into the field fairly. If so, they would have said, "Here is a list of prices that the men ask; you pay us so much, leaving us only 1 *s.* 3 *d.* or 1 *s.* 6 *d.*" Let them show that, and then you might have had a charge against the men. But I submit, that in no one instance, when the men were making those arrangements for the prices, did they not fully consider the masters, and wish them to have a fair profit; it was asserted by the contractors that the workmen actually assented to those prices, knowing that they were for the rifle musket. The price was sent in decidedly for the rifle musket.

7374. Then the assertion made in those different letters is, that subsequently the workmen, excited by those masters who did not get the contracts, raised the prices to prevent the fulfilment of those contracts. Will you state whether you think that that is a fair statement?—I was employed by Mr. Witton of Great St. Helen's during 10 years, and when the Board work fell off, two years ago, I left, and sought other employment; and during that time I never heard Mr. Witton attempt, neither did he, nor is he capable of doing anything for the purpose of counteracting the workman going on with his work; I should scorn, on the part of Mr. Witton, such an imputation on his character.

7375. Then those excuses given by the contractors were unfounded?—I only say so far as regards Mr. Witton, my employer, that he did not use that influence with his men.

7376. What are the great differences of character, except sighting, or are there any, between the workmanship of the rifle pattern and the other?—We know this, that that gun was got up in a most superior style; and I hesitate not to say, and I think it is easily proved by the Honourable Chairman, that the gun set up for our inspection was not got up in the ordinary manner by the workmen, but got up day by day by one of the best workmen in England; and, instead of costing 3 *l.*, I believe it cost nearer 5 *l.* or 6 *l.*; and that was held out to us as a pattern of a most superior and beautifully made gun, with a sight of a new character altogether. Hence we had a right to ask for a good price for our labour.

7377. Since those excuses were made to the Board of Ordnance, and there was no contradiction made on the part of the operatives, was not it reasonable that the Ordnance should look about to see how those abuses might be corrected?—I am extremely sorry to see that all the onus should have been put on the men; but which I submit any number of men may be put on oath to prove, that they have never yet demanded two prices in the midst of any one order.

7378. Do not you think that if the Government had an officer well acquainted with the trade in Birmingham, that would enable the Government to find out the real state of the case between the contractors and the workmen?—Putting it in that manner, I should hail it as one of the happiest things that could take place;

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it would clear from imputation or show the faults of the system, or whether the men were at fault or the employers.

7379. You think that any officer that you could appeal to, a man who knew the work of the trade sufficiently to know whether the workmen or the contractors were right or wrong, would be a mutual advantage to the Government and to the workmen?—I should hail it as a very happy period in London.

7380. Mr. *Muntz.*] Do you think that necessary, now that there is a man who understands his business so well as Mr. Gunner?—He is very easily accessible, I believe; I have heard so.

7381. He is quite competent to his business, is he not?—Yes.

7382. It is possible that Mr. Gunner might be succeeded by some one not understanding his business so well?—Yes.

7383. Did you ever work for a contractor of the name of Cook?—Yes; I worked two years for him before I worked for Mr. Witton; that was the only two years in which I was employed entirely on the Ordnance work. I was employed by Mr. Cook for two years on that work. I find on a reference to Mr. Cook's memorandum, that when I left him he gave me a very high character, which enabled me to get a very first-rate situation. During those two years I toiled incessantly, frequently from three in the morning to eight and ten at night; and at the end of that two years, such had been the litigious nature of the view, that I was indebted to Mr. Cook 56 *l.* or 58 *l.*

7384. *Chairman.*] What two years were they; before 1849?—Decidedly so.

7385. Were they in Mr. Lovell's time?—Yes. I mention that to show that I think that if either the men or the contractors had fair play, they could get up the Board of Ordnance work without difficulty; and if they had fair play, they could compete with any nation in the world in manufacturing arms at the price.

7386. Do you know anything about the inspection of Colonel Colt's pistols by the Board?—I am sorry to say that, while the gun-lock is inspected most minutely, and taken to pieces, the Board have not thought proper to strip or inspect all Colonel Colt's pistols, although costing 50*s.* They are merely looked at on the outside, the lock is shut inside; and I must explain, for the information of the Board, that they are not inspected; and a lot of workmen that I met last night, returning from Colonel Colt's, not only confirmed that, but they also gave me information which led me to believe that they are not taken to pieces.

7387. Are you quite certain that they are not stripped and taken to pieces?—I say that I am certain they are not stripped by the inspector, and examined into.

7388. Mr. *Newdegate.*] How do you know that?—I am not at liberty to say; I must break confidence if I explain that. I would explain, with reference to the pistols, that Colonel Colt refused to allow his pistols to be stripped; even in his American order, he would not allow them to be stripped; not the interior of them. They are inspected outside, but not inside.

7389. *Chairman.*] They were not taken to pieces?—No; not stripped, or taken to pieces.

7390. Mr. *Newdegate.*] Do you mean that none of them are?—I do not mean to say that none are stripped; there might be a dozen or two, or 20.

7391. Do you mean to say that the whole quantity have not been separately examined; each of them?—Outside, most decidedly. I must qualify my answer; they had been examined outside, not inside.

7392. Mr. *Muntz.*] Do you know any instance of any improvement having been suggested by a workman, that has ever been accepted by the Board?—Never by the Board of Ordnance; by the East India Company I have. There is a prevailing opinion respecting the Board of Ordnance, that anything submitted to them would not be considered, or was likely to be adopted; an order having emanated from Mr. Lovell that any suggestion of that kind would not have attention at all.

7393. *Chairman.*] Do you mean an improvement in any pattern?—I recollect being applied to when the pattern bayonet spring was brought out.

7394. Are you aware that the Board had nothing to say as to deciding upon the pattern?—No.

7395. Lord *Seymour.*] What was the case of the pattern spring to which you referred?—The East India Company rejected the pattern spring for the bayonet of the Government.

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7396. Was that alteration made upon the suggestion of any workman?—Of a practical man; the alteration in the Company's spring was made by a practical man, for which he received a reward.

7397. Mr. *Newdegate.*] In your answer you stated that no suggested improvement has been adopted by the Board of Ordnance; you meant, probably, by the department which decides upon the patterns of arms?—Decidedly so.

7398. Are you aware that that department is the Small Arms Committee, and not the Board of Ordnance?—I was not aware of that.

7399. Then your answer would apply to the Small Arms Committee?—Yes.

7400. Lord *Seymour.*] You have stated that the alterations in the patterns have frequently added to the difficulty of obtaining arms?—I said that that was the cause of the men's having frequently to make fresh bargains with their employers. Hence, as to every new pattern that came out, the men had to meet and decide upon the price. Many persons might have called them strikes. I only mention that to show that they are not what is generally termed strikes; but the Committee will find that there were very many different kinds of guns out, sea guns, altered muskets, and line guns, which required a re-arrangement of the prices.

7401. Supposing there to be an alteration in the lock, for instance, of the musket, is the workman obliged to provide himself with new gauges for the change of pattern?—Decidedly.

7402. Therefore, to the workman any change of pattern is a serious matter, as he has to provide himself with new gauges?—Yes, it is a considerable loss of time to him, and expense, certainly.

7403. Mr. *Muntz.*] There has been a good deal said about the advantage in guns being contracted for as entire guns, instead of the Board finding the materials for the gunmakers; can you give any opinion upon that point?—If I had the getting up of guns for the Board, I should prefer, decidedly, the plan of being supplied; and I think it is advantageous for the Board to be supplied by barrel contractors and lock contractors, and so on, most decidedly.

7404. As they are now?—Yes, I think that there are the strongest reasons for saying so. I think that the other plan would throw the monopoly into the hands of two or three, which ought not to be.

7405. Mr. *Newdegate.*] Are you aware that the East India Company, in the case of many of their arms, contract for the whole arm?—For their small arms, and for their pistols, they have done so.

7406. Has any inconvenience been found to result from that practice?—Yes, there has been in one instance a serious inconvenience.

7407. How was that?—The contractors having to supply the whole of the arms in one instance, wished to get their barrels made by different persons, and at a cheaper rate than amongst the old contractors, and for that purpose they employed a man and found him capital; but the barrels were found to be inferior, and were condemned, and they had ultimately to go back to the old barrel-makers for the supply, they having failed in supplying the materials.

7408. Upon whom did that loss fall?—Upon the contractors themselves.

7409. I conclude that, in your judgment, they would not be likely to repeat that attempt?—They never did; everything till then went on very smoothly, and has done since.

7410. You have not known that attempt repeated?—No; the inconvenience then was very trifling.

7411. Lord *Seymour.*] You stated that those barrels were all condemned?—No, not all; some of them were condemned; many of them were not taken.

7412. Mr. *Muntz.*] As you are a workman, you can probably speak as to the present state of the gun trade in London; are the workmen employed, or are they in distress for want of work?—I am sorry to say that many of them whom I daily see are in the most pitiable plight, having nothing to do whatever. I know of homes (if you might give them the term of homes, but they really are not deserving the name,) destitute not only of every comfort, but of the barest and commonest necessaries of life; and how can it be otherwise, after two years waiting for the Board of Ordnance work? Their homes are destitute and miserable, and I am sure if Honourable Members could see some of the homes that I could show them, they would indeed pity the men.

7413. Mr. *Newdegate.*] That has arisen from the absence of orders, and the protracted expectation of work?—Yes, and the men requested me last night to name

name to the Committee, that their case being a hard one, knowing that the Board have some 60,000 line barrels in store, it would be a great benefit to the Ordnance if they would give out some of those guns to the trade, and it would organise the trade before the rifle materials came into the market; a few thousands would do that.

7414. Mr. *Muntz.*] Will you read that Report to the Committee (*the same being produced by the Witness*)?—"REPORT in the House of Representatives in favour of Colt's Patent.—SAMUEL COLT.—To accompany Bill, H.R., No. 59, December 21, 1853.—Mr. Thurston, from the Committee on Patents, made the following report: 'The Committee on Patents, to whom was referred the petition of Samuel Colt, for the extension of letters patent granted to him on the 25th day of February, A.D. 1836, for a new and useful improvement in fire-arms, respectfully report, that Samuel Colt made his invention before the year 1832, but from the great difficulties which he experienced in reducing it to successful practice, and from his poverty, he was unable to procure a patent until 1836; that he, in the same year, assigned his patent to the 'Patent Arms Manufacturing Company,' a corporation in New Jersey, of which he became the manager; that Mr. Colt devoted five years after the date of his patent to the object of establishing his repeating arms, but that the company and he both failed, losing about 200,000 dollars, and many years of time and labour. At this time the invention had fallen into such disuse that none of the arms were made in the country, and the whole thing was considered a failure. The Mexican war created a demand for the arms; and the great success which followed their use during that contest, at once established them as the most valuable improvement in fire-arms which up to that time had ever been made. The patent, however, had been assigned to the Patent Arms Company, and Mr. Colt was very largely in debt, resulting from his former efforts to bring his invention into use. Under these circumstances, Mr. Colt applied to the Court of Chancery to settle the affairs of the Patent Arms Company, and the result was that in 1850 his patent was assigned to him by a Receiver in Chancery. At the same time the Commissioner of Patents extended the patent, so that Mr. Colt, in February 1850, began to enjoy the privilege which the General Act intended meritorious inventors to have, but which, for 14 years, he had been deprived of by no fault of his own. Mr. Colt, before the expiration of his patent, commenced himself to manufacture his arms. Their great success depends as much upon the manner in which they are constructed as upon the peculiarity of their organisation. So complicated a machine can only be made valuable by great accuracy and perfection in its manufacture, and that can only be done by perfect and expensive machinery. To procure that perfection has been Mr. Colt's constant effort, and as rapidly as profits arose from the sale, he re-invested them to increase and perfect his machinery. By this means he has brought his arm to great perfection, and at great cost; but as soon as the invention becomes public, the manufacture of cast-iron and other cheap and absolutely dangerous arms will drive out of the market those arms which are made with great care and expense, and ruining the business, which is conducted in a most costly manner, necessary to produce so perfect a result. Mr. Colt is confident that an extension of seven years will enable him so to increase and perfect his machinery, and to subdivide and cheapen his processes, that at the end of that time he will be able to furnish the consumers the most perfect arm which is capable of being made, at so small a cost, that manufacturers of spurious imitations will not find the profit sufficient to encourage the business. In order to protect himself from the destructive effects which would follow the introduction of these spurious arms into use in England, where he has no patent, and in Europe generally, Mr. Colt has established an armoury in London, to which he has carried American machinery, and which is operated entirely by American mechanics, and where he is now engaged in the attempt to demonstrate the superiority of his arms over all imperfect imitations of them, in the hope that the European consumers will discourage the manufacture of any except such as are perfect. In that undertaking, however, it is evident that he can make no money, but must control the market for the present by supplying the demand at the same price that inferior arms can be sold for, even at a loss. Already the English armoury has exhausted all the surplus which had been accumulated in this country, and is even now a constant drain on the resources and energies of the inventor. Yet he is determined to carry out his plan, impressed with the belief that unless the

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quality of the arms made can be maintained, the whole manufacture will fail. The reasons which are given for this belief appear to be very conclusive and satisfactory, and your Committee are of opinion that every encouragement ought to be given to Mr. Colt in carrying out his plans. The great object to be attained in the manufacture of fire-arms is perfect certainty under all circumstances; compared with that, the price is of no consequence. The public would not be benefited if such arms as these, manufactured in an imperfect and inaccurate manner, could be furnished gratuitously to every applicant; but the public will be greatly benefited by the supply of reliable, perfect, and effective weapons at any cost. The experience of the past has demonstrated that Mr. Colt, above all others, has supplied the great desideratum; and the constantly diminishing price at which the arms are produced and sold proves that his anticipations are reasonable, and that he will be able to manufacture them at such rates as to exclude all arms constructed on the same principle, of an inferior quality, from the market, to the great advantage of the public. The money which was lost during the first term of this patent, if applied to any ordinary business of manufacturing, would have given to Mr. Colt more than has ever been realised out of the entire proceeds of manufacture; and as all that has been realised has been invested in the manufactures, itself must share its fate. The whole of the proceeds of the manufacture have been thus far invested, in this country and in Europe, in the machinery, tools, and property fitted exclusively to the production of fire-arms; and the perfection and expense of this machinery are exhibited by the fact, that the separate parts which compose the arms are thrown promiscuously into heaps, and are so perfect that when assembled into a pistol they exactly fit each other, and any other part to which they may be properly applied; so that in using these arms new ones may be at once constructed out of the broken ones left on the field of battle, without altering the shape or size of the parts. Your Committee are of opinion, that as a question of profit and loss alone, Mr. Colt ought to have the benefit of an extension of his patent; he has made his plans for the purpose of constructing an armoury at Hartford, of such proportions and capacity as to enable him to manufacture these arms in their greatest perfection, but he hesitates to involve himself in so heavy an expenditure, unless he can be protected from the competition of inferior and worthless arms; and he would scarcely be able to finish his armoury before the expiration of his patent. For these reasons, it is important to him and to the whole country that he should now receive the assurance of safety which the extension of this patent will afford him. But in addition to this, the great service which Mr. Colt has rendered this Government, and which the people have derived from the use of these arms, as is evidenced by the common approbation of all the officers in the army and navy, and among all classes of our citizens who have used them, or seen them used; the truly American spirit and enterprise which Mr. Colt has exhibited in carrying this branch of manufacture into the heart of the great armoury of the world; the high marks of consideration which the military governments and scientific bodies in Europe have shown him, entitle him, in the opinion of your Committee, to this evidence of the approval of the Government. Your Committee therefore recommend the passage of a Bill, extending this patent for seven years, reserving to the Government of the United States the right to make and manufacture the arms in all of their own armouries, for military and naval purposes.' "

7415. Mr. *Newdegate.*] The purport of that report is, that the Committee recommend the American Government to give Colonel Colt a patent for seven years, in order to enable him to extend his trade in England?—In order to cover the losses that he has sustained by the machinery that he has put up here.

7416. In order to enable him to extend his trade in England?—Yes.

7417. Which is the greatest mart of fire-arms in the world?—Yes.

7418. They therefore create a monopoly for Colonel Colt in America, to enable him to extend his trade in England?—Decidedly so; he was refused, first of all, the patent by the American Senate, in a body; it was debated, and an observation made by one leading man in the Senate was, that he saw no reason to extend the patent for the protection of Colonel Colt, when he had recklessly advanced capital in England, and set up expensive machinery that was not paying, but was a great loss.

Mr. *Gage Stickney*, was called in; and Examined.

7419. Mr. *Muntz.*] WHAT is your occupation?—I am a mechanical engineer.

7420. Are you an American?—Yes.

7421. How long have you been in this country?—About eighteen months.

7422. What have you worked at since you came here?—I was superintendent to Colonel Colt's establishment.

7423. He brought you over, did he not?—Yes.

7424. Did you work at the same business before you came here?—About five years or six years altogether; I have been in his employment for the last six years.

7425. You worked for Colonel Colt in America?—Yes.

7426. *Chairman.*] Are you now superintendent of his manufactory?—No.

7427. Mr. *Muntz.*] You assisted, did you not, in the erection of all that machinery?—I had the charge of building it.

7428. Was it made here, or was it brought over from America?—A part of it; the smaller portions were purchased here, but the majority was brought over.

7429. Can you state what per centage of the manufacture of fire-arms can be done by machinery?—So far as my judgment goes, about 50 per cent.

7430. Have you been in the Springfield manufactory?—Not to work there.

7431. Have you seen it?—Yes.

7432. What proportion is done there by machinery?—As near as I can judge, being acquainted with the inspectors, I should say about 50 per cent.

7433. After using machines, you find it necessary to use skilled labour to finish the articles, do you not?—Yes, always; first-class labour, and the highest price is paid for it.

7434. Do you employ any children?—No.

7435. What class of labour is it that Colonel Colt uses here?—About two-thirds were of the medium class, the others were first class, about a third; he tried women, but that proved a failure to a great extent.

7436. He employs a few women, does he not?—Yes, we had more a year ago, but we found it a loss by them, as they had not judgment to attend to the machines, to know whether the work was going on right or wrong.

7437. You found it necessary to employ a better class of labour?—Yes.

7438. Can you give the Committee anything like the average price of wages paid for this labour by Colonel Colt?—The cheap labour is from 2 *s.* to 4 *s.* The first-class labour averaged, perhaps from 6 *s.* to 8 *s.*; some 10 *s.* per day; some more than that, 12 *s.*

7439. Are the Committee to understand that all the different parts of the pistol made of Colonel Colt, after having been prepared by machinery, are finished up by skilled labour?—Yes, by first-class mechanics.

7440. Every part must be finished by skilled labour, must it not?—If it is done properly, every part will be so done.

7441. Suppose you were to take it from the machine as first cut up, could you make it useful without skilled labour?—No.

7442. Have you found that to be the case?—I have never known any cheap labour capable of finishing any lock; with skilled workmen it requires long practice, so much so, that the first-class gunsmiths are not doing half the work.

7443. Colonel Colt stated to the Committee that he had commenced his manufactory for 12 months; and he also stated that he took people with common ideas and little knowledge of labour, and made them useful for his purpose; how does that agree with your experience?—It requires skilled labour to finish the work.

7444. Did he bring any skilled labour with him?—About 25 or 30 men; I considered them all skilled.

7445. In working with those machines, what proportion of the work is rendered waste?—I should say about 10 per cent. general waste, lost in the machine by carelessness in putting the materials in. Sometimes it may go to a heavier extent. When I speak of wastage, it is scarcely possible to fit it up; it is gone and past, and not worth fitting.

7446. Do you consider it is possible to interchange the parts of one pistol with another,

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another, as made by Colonel Colt?—I never saw a case of the kind. I have heard of it, but I defy a man to show me a case.

7447. When I was there, I saw a man filing the parts up, put a punch-mark upon each part; what was that for?—So that each part may go where it is designed to go as you put them together. The parts are given to the fitter, and he fits them as he goes along. They get mixed in promiscuously, but are numbered, and then we pick them out; they are kept in separate boxes, or cases, that they may not be lost.

7448. *Chairman.*] Then you have to hunt for the right number?—Yes; and for the right piece.

7449. That must take a great deal of time?—That has to be done; it takes some time.

7450. If there is one little piece put among, say 1,000 others, it must take a great deal of time?—No; it is not done in that way. There is a box made with 12 cases; there is a pistol here (*describing the same*); here is a barrel numbered; and here is a small piece of the lock-work in another little case, like a printer's type frame; here are the hammers, and you must try and fit, and pick them out, to find out where they will operate. They are made in large quantities, but they have all been fitted by the files previously to being put into those boxes; not by machinery.

7451. If you had 5,000 pieces of this stock together, if they are all numbered it must take a long time to find out, say 4,590?—We never put up that quantity; when you see large quantities of 5,000, they are in store. After they have fitted the hammer to the pistol, each man has 10 little cases, and he puts the limb-work in here (*describing the same*), and the barrel and the cylinder, and he retains those little pieces; and if they were interchanged here or there, they would not fit.

7452. Did you hear the report from the Committee of Congress that was read by the last witness?—Yes.

7453. What do they mean by saying that the parts interchange?—I do not know what they mean. I know that the American work never was gauged.

7454. If they do not interchange in America, the Committee of Congress must have expressed a very wrong opinion?—They calculate that it is very near alike; but it requires an armourer to interchange it if it does interchange at all.

7455. Mr. *Newdegate.*] You mean a workman?—Yes, it requires fitting and filing, the same as any other.

7456. *Chairman.*] When did you leave Colonel Colt's manufactory?—About three months ago.

7457. In the last month while you were there, was there so much waste work as there was at the beginning of the manufactory?—There has been more since; the work has been condemned to a great extent since. It happens in times with the machinery, and the same has occurred at home in the last year. Large quantities were condemned by the machines not operating properly.

7458. Are the Committee to understand you to say that it is getting worse, and less accurate than it was at the start?—I do not know that it is getting worse; probably it is about the same.

7459. You stated, did you not, that about one-half of the work was done by machinery?—Yes, about 50 per cent. of the money expended.

7460. Suppose that the pistol cost 1*l.*; 10*s.* would go to labour, and 10*s.* to profits, and so on?—Yes, that is what I mean.

7461. In the present Minié rifle which is used in this country, the price of materials is 10*s.* 9*d.* only, and the price of the whole musket is 3*l.* 9*s.*; in the way that you speak of in which the price would be distributed, half would go to labour, and half to materials and profits?—No; one-half is machine labour, and 50 per cent. hand labour; that has nothing to do with the materials.

7462. Colonel *Boldero.*] Have you visited the American Government's establishment at Springfield?—Yes, often; but I never was engaged there.

7463. What is the nature of the machinery that they have there?—Very similar to Colonel Colt's; that is, so far that it would require different machinery for a musket, but it is a similar class; in fact, Colonel Colt has copied his from Springfield.

7464. Have you seen that machinery in operation for making stocks?—Yes, I have seen it.

7465. Are

7465. Are all their stocks made by that machinery?—All that are made at the Springfield armoury are.

7466. Is it quite successful?—Yes, it is passably successful; I hear no fault found with it; I am not well acquainted with the stocking part of it, we have none; all I know is by visiting it.

7467. *Chairman.*] Is the musket that they have turned out a good one?—It is considered a fair one.

7468. Colonel *Boldero.*] In what respect does the stock differ from ours?—The material is somewhat different; it is more easily worked, and the form is much more plain.

7469. Is the weight of it less?—It is a lighter wood.

7470. It is not so durable, is it?—I think not; there is a vast difference between the American walnut and the English walnut.

7471. Do you know what number of muskets they turn out annually?—I do not know.

7472. Are there not three or four private establishments in America?—Yes, four or five.

7473. Do they stock by machinery?—No one does.

7474. Can you give any reason why our gunmakers in England have not introduced that machinery?—From the description that I heard here yesterday, I understood that a similar machine had been introduced, and from the description given, I conceive that it is the same; it is Blanchard's patent. I think it was tried in Birmingham, and if it has failed, it is partly on account of the timber being much harder to work, and cross grained; so far as we have used English timber, our men require just double the price, it is so much harder; we call it fancy stocking, and we pay just double the price.

7475. Mechanism in this country has arrived at as great perfection as it has in America, and surely our traders and merchants could put up machinery to work just as they can in America?—I am very well aware of that, and I have seen plenty of it.

7476. There is no reason why we should not get muskets stocked by machinery as the Americans do?—I think the Americans pay as much for hand labour as I have seen some stocks made here for, after they have gone through the machines.

7477. However, we should gain expedition, if not cheapness?—I cannot say.

7478. Mr. *Muntz.*] You stated just now that there was a difference in the timber; you mean, do you not, that our walnut, being cross grained, is not so easily worked in the machine?—No, it is much harder; ours is very straight grained, and very soft, and very easily worked.

7479. Mr. *Geach.*] If English walnut were taken over to America, and put in those machines, could it be worked?—In some machines I think there would be a difficulty. In a general turning machine it might pass, but I think it would tear out, and rip out, and spoil the stock.

7480. Mr. *Muntz.*] Have you examined minutely the present Minié rifle?—No.

7481. You cannot speak of the work in it as compared with the American musket?—No; I am not well versed in the musket line, to any extent.

7482. When you stated just now that you paid a man twice as much for working English wood as American, did you mean in making pistol stocks?—Yes, in every case where I have seen it worked.

7483. Have you examined the machinery that is now used for different purposes in the gun trade in this country?—To a certain extent.

7484. Did you see them make barrels in America, at Springfield?—Yes.

7485. Do you know whether they are made on the same principle as they are here?—No; they are made under tools and hammers; they do not roll them.

7486. Do they bore as we do?—Very similarly; they are bored mostly by English workmen; the business was started by them.

7487. Are English workmen working at it now?—A part of them are English workmen. Our principal men over there for boring barrels are English workmen.

7488. Have you heard that there is a disposition on the part of the American Government to leave off manufacturing themselves, and to contract with others?—I learned that through the papers; there was a committee appointed last year to see whether they should extend the armouries or not, and they visited the

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private establishments in Philadelphia and various other places, Colonel Colt's, and the Springfield armoury.

7489. Did they come to any determination?—I think they have not; as near as I can learn, they have gone in favour of individual contracts. I do not say that for certain.

7490. Are there parties there competent to contract for any quantity of work?—Yes.

7491. Do they use machinery?—Some do; about the same as ordinary gunsmiths.

7492. Is there any stocking of the gun by those parties by hand?—The Philadelphia people all stock by hand. I think there is a place also in New York where they may use a lathe or two.

7493. They do not cut the stocks up by machinery?—No.

7494. Does Colonel Colt cut his pistol stocks by machinery?—He uses very little; he may use a circular saw, but that is a general thing, and a circular cutter. About 10 per cent. of Colonel Colt's stocking is done; less than that, of the two.

7495. Has Colonel Colt patented any of his machinery?—He has patented some of it.

7496. Here or in America?—None in America. He has patented a few machines in this country.

7497. Were they quite new?—No. I have seen a machine that has been used in Birmingham for two years before he came here, for drilling barrels, pistol work; and I have seen one since then for the same purpose.

7498. You think that in making pistols the best skilled labour is the cheapest, when you also combine machinery?—According to my judgment, it is.

7499. You found that at the time that you worked with Colonel Colt in this country?—Yes, here and in America.

7500. The quantity of waste made by unskilled labour is so much greater in proportion, that it becomes the dearest labour?—Yes, it requires skilful persons to manage a machine, or else the waste is so great; and equally skilled people, after it has gone through the machines, are required for the hand labour.

7501. If you have very highly skilled workmen to work at the machines, great expense is necessary to keep the machines in order?—That is what we brought 25 men for; to do nothing else.

7502. Are they now employed in doing that?—But few are left of them.

7503. Have you ever tried to purchase materials for pistols?—Yes; I sent to Birmingham in one or two instances.

7504. What sort of materials did you try to buy?—Scear-springs and nipples, and some little things.

7505. Instead of making them?—Yes, though we had a large stock on hand, we sent merely to get the prices; we did not purchase.

7506. How long was the machinery being manufactured that is in use at Colonel Colt's?—We commenced it in 1851, and the last lot arrived here about three months ago; about three years since it was first ordered.

7507. Was it all ordered together, or in parts?—It was ordered as a general thing; we started a shop on purpose to build it; a part of it was purchased, and not built in this shop. We started a shop with some 60 or 80 hands expressly to build it, and I had the charge of the shop in the State before I came here. The last lot has just arrived here; it was finished in that shop. The whole was not done in that shop; what they could get; part was made in other shops.

7508. What is your opinion as to the comparative cheapness for which muskets can be made in England or America?—From what I have seen I should say that muskets could be made here for less; I have seen a musket here for 8*s.* which you could not get men to do in America. As to good quality muskets, they are similar, the prices; all I judge by is the exportation to America.

7509. Are there any made in America, except for and by the Government?—Probably very few; most of them are English concerns; the heaviest concerns in New York are English.

7510. They obtain materials from this country, do they not?—To a great extent; the cheapest concern we have is the manufacture of revolving pistols; the forging is done in Birmingham, and the materials sent from here.

7511. Do you think that a greater supply of skilled labour than is now used by

by Colonel Colt would improve the quality of his pistols?—It requires more skilled labour on them to bring them up to the proper standard.

7512. So as to make them perfect?—Yes.

7513. Have you ever seen the experiment tried to make pistols, by using more skilled labour than is generally used?—Not till of late; I have seen considerably better work.

7514. Better than Colonel Colt's generally?—Yes.

7515. Of course it is more costly?—Yes, the more highly finished, and the better fitted they are, the more they cost; but it does not cost so much in this country as it does in ours, on account of the surplus of labour here.

7516. Can you state to the Committee what is the average rate of pay for labour at Springfield?—The lowest is about 8*s.* a day; perhaps the lowest is from 6*s.* to 10*s.*

7517. There is no common labour employed there, is there?—I never knew of any.

7518. Not in connexion with the machine that does the wood work?—In that part they are very superior workmen, and it requires extraordinary workmen to manage the machine.

7519. Did you see many stocks made by machinery?—No. I have been there about a dozen times; when I was in Springfield I paid a visit there, and being connected with Colonel Colt, I paid more or less attention to see what was going on.

7520. Did you ever hear whether they made any waste stocks by that machinery?—Some; because we buy them and use them for other purposes, and cut them up for pistol stocks.

7521. How are they principally made waste?—Because they are cross-grained, or something of that kind, and the machines would not work them. They make more or less waste work at the Springfield armoury, and it is sold at auction principally every year; it is always condemned and disposed of; I could not say definitely as to the quantity.

7522. Your opinion is, that in consequence of the difference between the quality of the English walnut and the walnut in America, the waste would be considerably increased?—I am certain of it.

7523. And it would take longer to work it?—I think it would; there are many operations in the machine, and the machines would require more attention; if it is out of order, it requires a long time to get it right again, and the English walnut would be a serious detriment as to getting the machinery out of order.

7524. Can you state whether any of the work at Springfield is paid for by piece-work?—Generally by piece-work.

7525. When you spoke of wages, you mean that their wages amounted to what you stated?—That is about the average.

7526. *Chairman.*] How many machines do they use at Springfield to make stocks?—I never paid any particular attention; I think from eight to ten; perhaps 11.

7527. Was not the machine that was described here yesterday a single machine for making the whole stock?—That is the portion that makes the breech and shapes it.

7528. That machine was described here yesterday?—Yes; and it is used for various purposes; turning spokes. It is common here as well as over in America.

7529. That is not the same sort of machine that is used at Springfield, is it?—It is on a similar principle; they have various machines; they formerly did all the outside work in that machine.

7530. Has not Colonel Colt a manufactory in America?—Yes.

7531. Have you been employed in that manufactory?—Yes, five years.

7532. Is there as much machinery used in that manufactory as in the one here?—About the same.

7533. Has he made any improvements since he came here?—A few improvements, such as the men suggest; there is scarcely a man that does two jobs alike; there is no definite improvement that I know of.

7534. In the rifling, has he not made an improvement here?—Those machines were built in America, from some patterns that he uses there.

7535. Is the rifling machine that he has here exactly the same as the rifling

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machine that he has in America?—A perfect *fac simile*, from the same pattern, made from the same brass.

7536. Is he anxious now to extend his machinery in America?—I do not know; that depends upon circumstances; he is now working for the extension of his patent, and if he gets it he may extend his business.

7537. Then he finds his business answer?—Not as it did; it was the private speculation in the Californian and Australian trade that made his business.

7538. As he is going to extend his business, I presume he thinks it pays him?—If he gets demands the same as any other man, he will do business; but I have not heard of his extending his business, unless he monopolises this patent, and monopolises the trade in revolvers. He shuts up every one in America, and he keeps the whole of it himself; he has closed every establishment.

7539. For every sort of revolver?—He grants the privilege now and then to one.

7540. Mr. *Dundas.*] Is that from the cheapness with which he sells them?—No, fighting them by law; he closed the Massachusetts Arms Company; that was the heaviest concern that he closed.

7541. Mr. *Geach.*] The Committee have been informed that the gun is almost entirely made by machinery at Springfield; is that the case?—There is scarcely a piece of a gun that does not go more or less into the machine, but it requires hand labour more or less, applying the machine to the rough of it.

7542. You find machinery in this country, do you not, for doing the rough work to some extent?—Yes.

7543. And cases where they find, even if machinery can be invented for doing the rough work, it may be cheaper to do it by hand labour?—I have seen machine work, and some superior forging, that did not require so much machinery here as it does in America.

7544. That is all a question of expense; an article is not better because it is made by machinery; it may be made by hand quite as well, may it not?—I do not see any difference.

7545. Mr. *Newdegate.*] Do you know what the price of the American musket is?—Not to a certainty; I know that it is from eight to nine dollars, a little short of 2*l.*; but I do not know certainly; I have not taken the pains to inquire, being unconnected with that branch of the business.

7546. Do you know whether there are any reports made to Congress, or to the House of Assembly, which would give the price?—I do not know.

7547. *Chairman.*] Do you know anything about Hall's carbines?—Yes; that was the original breech-loading gun some years ago; it is 20 years old, I believe.

7548. Do you know whether they are made by machinery?—That was about the first machinery introduced into the States, at Harper's Ferry.

7549. Do you know that in the view of those carbines the Government of the United States require that all the different parts should be tried by interchange one with the other?—As a general thing, I am well acquainted with the inspection in the United States, but as a general thing they try the working points, not the outside; they gauge by the eye, and if you take a hammer you see that it is a full fair hammer; they gauge the working points as a general thing; they always talk about interchanging, but that means that each hammer is made so near alike, that in case one broke a competent armourer could take it off and put on another by filing and fitting.

7550. This is one of the directions, "Apply one catch-plate to all the stocks; put in a receiver, and ascertain that it fits the catch; also apply all the catch-plates to one and the same stock, the receiver ascertaining that each one fits"?—That amounts to the same system of gauging as I have seen explained here.

Mr. *William Beasleys*, called in; and Examined.

Mr. *W. Beasleys.*

7551. Colonel *Boldero.*] YOU are a Barrelmaker living near Birmingham, are you not?—Yes.

7552. How long have you been in the trade?—I have been connected with the trade for 14 or 15 years; in fact, from my youth.

7553. You are the inventor of a new process of making twisted barrels, are you not?—Yes.

7554. Have

7554. Have you not taken a patent out for it?—Yes.

7555. What is the title of it?—It is for improvements in the manufacture of metal tubes and solid forms, that is my title; but of course the twisted tube comes within that title.

7556. Have you got a specimen of your work with you?—Yes.

7557. Will you produce it?—Yes (*producing the same*); this is a coil, or a mould.

7558. Will you describe the process?—I first of all take a strip or a string of iron tapered in the length, and bevilled at the edges, and slightly concave on the under side; this strip of metal is coiled round a mandril, or rod.

7559. Lord *Seymour.*] Have you ever made any rifle barrels?—No.

7560. Colonel *Boldero.*] Have you made any musket barrels?—No; the kind of barrel that I have hitherto made is the common twisted barrel.

7561. What are the advantages of your system over the old one?—A vast number can be made in the same time, and with a small amount of steam power.

7562. You combine rapidity and economy in the manufacture?—Yes.

7563. It also combines strength with perfection, using two pounds less of metal for the barrel than according to the old system?—Yes, at least.

7564. Mr. *Dundas.*] The strength is greater?—Yes.

7565. Colonel *Boldero.*] How often is the barrel submitted to the fire?—Only once, in the course of welding.

7566. What is the cost of your machinery?—Not more, I should think, than 100 *l.*

7567. What test and proofs have your barrels undergone?—The same proofs as are given to the barrels in the Birmingham proof-house; I have not had any tried in London.

7568. At what price do you make that barrel?—I am hardly prepared to state that at present; I thought that I should only be called on to show the process.

7569. Is it the ordinary mode of making a twisted barrel that is commonly in use in the construction of the barrels of fowlingpieces?—It is the same kind of barrel; there is nothing new in the barrel itself, only in the process of making that barrel; the twisted gun barrel in the general way is made in two or three pieces, and the advantage of my method is in the tapered string, the string of metal in one piece.

7570. *Chairman.*] Do you conceive that your method is cheaper?—Yes, very much so.

7571. Mr. *Dundas.*] Is not the welding of that barrel very much increased by having the length so great?—No.

7572. Colonel *Boldero.*] Could your machinery be applied to the making of musket barrels?—Yes.

7573. Are you willing to let the Government have a trial of your machine, remunerating you for your expenses?—I have no objection.

7574. Mr. *Dundas.*] In welding that barrel do you make it red hot, and pass a mandril through it, and then weld it together?—It must be more than red hot, it should be welding hot; it is removed from the furnace by means of a mandril, with a shouldering upon it to jam or jump the joints together.

7575. Colonel *Boldero.*] I am informed that you can make that barrel at 1*s.* 10½*d.*, is that the case?—Not this kind of barrel.

7576. Is that the fair average cost of that barrel?—There are 9 lbs. of iron, that is, for making a pair of common twisted barrels; of course they are very much lighter than the Government rifle would be; that, I suppose, would take twice as much, being so much stronger.

7577. You have no objection to your process being tried at Enfield under your superintendence?—Not the least.

Mr. *John Anderson,* called in; and further Examined.

7578. *Chairman.*] DID you hear the evidence of Mr. Evans yesterday?—Yes.

7579. Will you explain to the Committee how you came to have any connexion with the bullet press which he and Mr. Lovell made together?—The

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press was made by Mr. Evans for Mr. Lovell; and once or twice after it had been supplied to Mr. Lovell, he came to the Arsenal, and spoke to me about certain defects connected with it, and asking my opinion if I thought that it could be improved. Some points that he referred to I thought could be improved; and then he requested Colonel Dundas to allow the press to be put into my hands, to make it workable, which it had not been at this time.

7580. Did that press make the bullet in a satisfactory manner?—To say that it never made a bullet would be wrong; but it never made them satisfactorily. Indeed Mr. Gunner, who had it under his charge, does not think that it ever made 20; and when we got it down to Woolwich we could hardly make a bullet at all. Not that it could not have been altered to make bullets.

7581. Did it not make the bullets of the same size and shape?—I can soon explain the whole thing. This which I hold in hand (*pointing to the same*) is a die belonging to the press which was made by Mr. Evans. The press was a simple common screw press used through a great many branches of trade to compress anything. It was a simple screw worked by a lever, and underneath this screw was this instrument, the die. A piece of lead was cut off by an apparatus, by hand, to be laid in by the finger into this die, and the weight of the bullet depended upon this piece of lead only. The great objection to this arrangement was, that there was no getting those pieces to come to the same weight, and in trying to get accurate shooting they had to scrape them and weigh them so as to get them to the same weight. It was brought to me to see if I could make them of equal weight by feeding them in some self-acting way. There were other objections attached to the press that might have been got over, but having to work it by too slow a process, it would not repay the trouble required to make it work self-acting.

7582. Is there much difference between Mr. Evans's press and your machine?—There is not only much difference, but there is no comparison whatever. Mr. Evans said that there was no comparison in any way except in two points. Mine is a real machine that works on continuously, and turns out a stream of bullets; and the other was a simple hand press. A piece of lead was put in, and then the bullet was forced, by the pressure of the screw, into the shape of a bullet, and ejected out; great pressure is required to squirt up the bullet; it required considerable effort, and was very slow.

7583. What were the two points in which Mr. Evans said that you had copied his machine?—The first point was in the die; now I think I can show to any impartial individual that the two dies are not at all the same in principle, nor in arrangement, nor in any respect alike. In the case of the die of the press it was simply a piece of lead containing a quantity that was put into the die, and in order to get a perfect bullet the other die had to fall right down into the matrice; there was a projection upon the one die that had to fit precisely into the other, in order that the whole of the lead might go to the bullet. It was necessary that the whole of the lead should go towards the bullet, and in order to secure that the punch was made so as to fit into the die, so that the whole of the lead might form a bullet like this (*pointing to the same*). Now, the objections to this arrangement were these, that in order to secure that, it was absolutely necessary that they should fit with mathematical correctness; if they did not fit, the lead would be squirted from around the bullet; it was absolutely necessary that the machine should be perfect, for if there was the slightest motion of anything, one die would touch the side of the other, and produce a fracture. The dies were expensive, and very liable to injury; and I saw that if success was to attend the making of those bullets, it must be by some arrangement by which the dies should not come into actual contact. That drove me to the order of arrangement which I will now describe. In the first place, in my arrangement the dies do not come together at all, not within the thickness of a piece of paper, and in designing my machine I thought of clearing off the frills which form around the bullet by bringing the dies into contact on the face, but doing that by pressure, and not going the one within the other; but I soon found that if at any time too little lead was put into the die the two pieces of steel would come into contact and fracture each other, and I got over that by introducing a third die. The arrangement is this: the machine is self-acting, it cuts off a piece of lead and deposits it in the die; then the other die comes forward and squirts in amongst the lead and brings it into a thing like a bullet with a frill on it; then immediately that this die retires, supposing the bullet has been formed and a frill

a frill exists upon it,—as soon as this gets out of the way there is a third thing comes up in front, and the bullet is forced through that third thing; thus leaving the frill at the back, and the bullet leaps out at the front. That is the first point in which I am said to have copied the former arrangement. The second point was quite different: it was said that the mode of ejecting the bullet from the die was the same; I think it will be seen that they are quite different. In the case of the press it was got out in this manner (*describing the same*). Attached to the screw, which was worked by hand, there was a kind of bridle which is connected at the bottom of the die; that is, the screw goes back again and pulls this forward (*pointing to the same*), and pulls the bullet with it. In the arrangement which I employ for taking the bullet out of the die it is quite a different plan altogether: along one side of the machine there is a shaft revolving with a series of cambs upon it, and these perform several operations connected with the working of the machine. At each end of the shaft there is a particular kind of camb working on a spindle which slides backwards and forwards, and the bullets are ejected. If the arrangement had been carried out that Mr. Evans used, this spindle that goes backwards and forwards here (*describing the same*) would have had a bridle, and pulled it out and in; but it is quite a different thing, and performs the operation in a different time, and for a number of reasons it is quite different in every respect.

7584. Was the lead for Mr. Evans's press prepared in the same way as you have it prepared?—The lead for that press was cast into bars in the Arsenal at Woolwich, and sent to Enfield to be cut into little pieces to be put into the press by hand. The lead for this machine is put into an hydraulic press, and squirted out in the way that leaden pipes are made. It was made for the first time for this machine to let it be made self-acting.

7585. In what way did the feeding of the press with lead differ from your method?—In Mr. Evans's method the intention was to put a piece of lead in every time, and then bring the lever down upon it, and then the screw in going out again pulled it upwards, and then another piece of lead was put in; in the other machine a quantity of lead, as much as a ton, is put above the machine, and it works without any assistance, cuts the pieces off, and feeds it, without any assistance.

7586. How many bullets can your machine make in a day?—There are eight dies driven at the speed of 25 revolutions in a minute; 12,000 is the number, or upwards, that should be produced, but 10,000 is about the number; in fact about 100,000 a day is the number now being made by them. One day last week 200,000 were turned out in 21½ hours.

7587. At what cost for manual labour?—There is no cost whatever as to making for wages; the wages paid would have to be paid even if the bullets were made by a process worked by hand. The machine works on continuously, and the labour performed is to bring the lead forward and carry the bullets away, unless it is oiling the machine; there is nothing beyond that; any expense would be incurred with the other.

7588. Colonel *Dunne.*] Are you not aware that the accuracy of the flight of a ball is much improved by its being pressed instead of being cast?—If the dies are good, we get perfect bullets; a thousand made in a die would always come to a grain; in cast bullets very much is dependent on the temperature of the lead, and in the case of bullets made by the press it depends entirely upon the quantity of lead put into the press.

7589. Mr. *Dundas.*] A pressed ball is considerably heavier than a cast bullet, is it not?—Sometimes the specific gravity is a little greater, but not much; I I forget how much.

7590. Mr. *Newdegate.*] If I understand your explanation aright, the actual pressing is on the same principle as the machine of Mr. Evans?—Not in any respect; the one is a screw, and the other is an eccentric.

7591. Your motive power is different?—Yes.

7592. But so far as the actual principle of placing the ball into the die is concerned, that principle is the same in the press by Mr. Evans as in yours?—There is nothing new in it; there have been machines for round bullets made by pressure.

7593. That which you introduced was the application of steam power, and the feeding process for the dies, and the cutting off process?—Yes, and there are a great

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great many other things, if the Committee would like them explained, that have been added to this machine, that it would take time to go into.

7594. Mr. *Muntz.*] Have you ever seen any of the bullets made by Mr. Evans's press?—Yes.

7595. Were none of his bullets good ones?—If a quantity of lead was put in, you would have a quantity come out in a bullet; but one great objection to the press was, that the bullet would not stop in this die, but go out on the punch. When first spoken to on that subject, I recommended that this die should be widened on the inside; I did that in ignorance; I did not know the cause at that time why it came out on the punch.

7596. The question is, whether Mr. Evans did not make good bullets with his press?—I do not think 100 have ever been made in it altogether.

7597. Were they 100 good ones?—We did not think them good; they were not good.

7598. Mr. *Geach.*] You had Mr. Evans's machine, you found that it did not do the work so perfectly as you wished, you improved upon it, and did do the work?—It is not the same thing at all.

7599. You had Mr. Evans's machine before you made your own?—Yes.

7600. Mr. *Muntz.*] There is one of Mr. Evans's bullets (*pointing to the same*); what is the difference between that and those which you make?—I do not consider that a bullet that would pass at all; there is a great difference between the two.

7601. Does the difference arise from the difference in the principle of the machine?—The press with certain alterations could make a good bullet, but it would still work at an immense disadvantage compared with my machine.

Veneris, 7° die Aprilis, 1854.

MEMBERS PRESENT.

Sir W. Molesworth.	Mr. Muntz.
Mr. Monsell.	Lord Seymour.
Colonel Boldero.	Mr. Newdegate.
Colonel Dunne.	Lord Paget.
Mr. Dundas.	Mr. Walpole.
Colonel Lindsay.	Mr. Geach.

THE RIGHT HON. SIR WILLIAM MOLESWORTH, BART., IN THE CHAIR.

Mr. *Westley Richards*, called in; and Examined.

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7602. Mr. *Muntz.*] YOU are a Gunmaker in Birmingham, are you not?—Yes.

7603. What experience have you had in the manufacture of military arms?—Only in the last two years I have been making a few patterns for the Ordnance.

7604. How many patterns have you made?—Altogether I should think about 90; not all for the Ordnance. I made 90 before I was satisfied with those I sent to the Ordnance; the Ordnance had not more than three or four out of the 90.

7605. Lord *Seymour.*] Were they patterns for a musket?—Yes.

7606. Colonel *Dunne.*] Were they not rather experiments to try what would be the best musket to make?—Yes; with that object the 90 were made.

7607. Mr. *Muntz.*] Had you any contract from the Ordnance?—Yes, for a few sights.

7608. In the last two years?—I never had a contract for muskets; the contract for sights was in the last two years.

7609. What were the circumstances under which you had a contract for sights?—It was a sight that I had invented for the Board, and registered. I simply wished that I should not give up the registration, and I took a contract, and applied to some of the material contractors in Birmingham to make the sights for me.

7610. Mr. *Newdegate.*] If I understand you, this one contract was merely a part of the experiments that you had been conducting with a view to assist the Board of Ordnance, or was connected with the experiments that you were conducting with a view to assist the Board of Ordnance?—The contract was, I think, for 400 or 500 sights for the new muskets.

7611. That contract was connected with the experiments that you had been conducting to assist the Board of Ordnance?—Yes.

7612. Mr. *Muntz.*] Do you know the system that is now pursued by the Board of Ordnance to obtain arms?—Yes.

7613. Is it the best system that can be pursued?—I do not think it so good as contracting for the whole musket.

7614. Do you think that a large quantity would be obtained under that system?—Yes; I think that a large quantity would be obtained under that system more easily.

7615. And also more cheaply?—I do not know that it would be cheaper.

7616. Would the quality be equally good in each case?—I think that the quality would be quite as good.

7617. Do not you think that with good regulations, under the present system, a very large quantity of arms might be obtained without altering the plan?—Yes, I have no doubt that they might be.

7618. Still you think that more materials might be obtained by ordering the entire gun from the contractors?—I think it would take a great deal of trouble out of the hands of the Board of Ordnance. I think that there are a great number of people who enter into contracts for materials who want constantly looking up, and that it is done better by contractors than by the Board.

7619. Would you recommend the view to be conducted on the same principle?—Yes, just the same.

7620. What number of contractors should you say there ought to be for the proposed demand of the Government?—There are now four, and there are advantages in both a large number and a small number; a small number of contractors (say four or six) would take a contract at a less price than if it was divided into 10 or 12 separate contracts; and it might be an inducement to put up more expensive machinery with fewer contractors. On the other hand, if there are a good many contractors, there is this advantage: that in case the demand for Ordnance work was not so great, they have a greater private trade to absorb the surplus labour.

7621. In the one case, you consider that having a larger quantity to make would enable the contractors to lay out money for machinery. On the other hand, you think that a large number of contractors would have a large quantity of private work to employ their men with?—Yes.

7622. How should you choose the contractors?—I should propose to make it known that I wanted a certain number of arms, and let the contractors give in their names to the inspector of small arms, offering to contract. I should then make inquiries, see their premises, find out their capabilities, and fix upon a certain number of them from what I saw. I should give them each an Ordnance musket, and let them make from that six or eight patterns, with an equal quantity of materials, and send them in to the Ordnance Department; the Ordnance should then fix a certain price, whatever they made up their mind to give; and I would let the competition be for quality rather than for price.

7623. Should you confine them to the quality of the pattern, or let them make the best gun they could make?—I should allow them to make the best gun they could for the money that the Ordnance fixed on.

7624. You state that the Ordnance ought to fix the price, and ask them to make a gun according to that price?—I think so. If you wanted to expend 3*l.* on the musket, I would give a pattern, and let the contractor make six or eight patterns; and if he could make them better than your pattern, so much to the advantage of the Ordnance.

7625. Mr. *Monsell.*] Do you wish the Committee to understand that the Ordnance ought to send to the contractors, selected in the way that you have described, a pattern musket, and that they ought to send with that pattern musket the price?—Yes.

7626. And that they should simply say to the contractors, "Will you make a musket equal to the pattern for the price that we have fixed upon"?—Yes.

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7627. Mr. *Newdegate.*] You stated, did you not, that they are to make the best they can, according to the pattern?—Yes, the best quality of musket; and if they can improve upon the quality of the Ordnance pattern musket, at a given price, let them do so. I would make it a competition for quality instead of price.

7628. Mr. *Muntz.*] Do you think that competition for price is a good thing for the public?—I think it an oppressive thing for the men; and I think that it is very often the cause of strikes.

7629. But are they to attempt to do the work for less than they can afford in consequence of the fixed price?—I think that when you create that intense competition people are very apt to take the gun at a low profit, and then they are obliged to get something out of the men.

7630. Mr. *Monsell.*] Would not the competition for quality have the same effect?—No.

7631. Why not?—If you have a fixed price for anything the men would not be beaten down.

7632. A contractor might say to the Board, "I will make you a better musket, in other words, a higher-priced musket, for the price that you fix upon it;" and the contractor so doing would have to screw the workmen down in exactly the same way?—I think it would have a different effect.

7633. Can you explain why?—In the one instance you are trying to get the musket at too cheap a rate; you give a fixed pattern, and the men make the musket before they settle their prices. If I was to take a contract, and was to give out a musket, a man would make six of them, and I should take care to have the prices fixed and agreed upon between the men and myself; that has not always been the case.

7634. The quality represents money, does it not: therefore the contractor who said that he would make a musket of a better quality for the same price that another man said that he would make a musket of an inferior quality, would have to expend a larger sum of money in carrying out his contract than the other man?—The quality would depend very much upon his own arrangements, upon little matters which no one but a gunmaker could attend to.

7635. Mr. *Newdegate.*] You mean this, do you not, that you would have the pattern fixed, which should be a security against the quality being inferior to the pattern?—Yes.

7636. But you would give the public service the benefit of competition in obtaining anything superior to that at that fixed price?—Exactly.

7637. Mr. *Muntz.*] Do the contractors make arrangements with the workmen before they accept contracts?—In some instances they do, I believe; not always; that has not always been the case.

7638. They generally do, do they not?—Yes.

7639. You think that competition in price is likely to prevent a good understanding between the master and the men?—Yes; that is my objection to it.

7640. Do you think that that want of a good understanding between the master and the men would naturally lead to strikes, and that the men, feeling themselves oppressed, would join to oppose the masters?—I think so.

7641. Do you think that the Board could get their supplies more cheaply by public competition?—I think they might; but not much.

7642. Not enough to make it worth while, considering the difficulties?—I consider that the difficulties would be increased by it.

7643. What is your opinion as to the supply of stocks?—I think that the Board could always supply the stocks to much greater advantage than the contractors could. The foreign stocks that are used re quire keeping for a year or two before they are perfectly dry, and it would be a heavy stock for the contractors to bear.

7644. Do you propose that the Government should find the stocks?—Yes, that they should find the stocks only, and let the contractors find everything else.

7645. And that they should charge accordingly?—Yes.

7646. Is that course pursued now?—The Government finds stocks and materials of every kind now, and they contract for the setting up only.

7647. Having fixed upon the contract, would you propose to give out the orders in the way in which they have usually been given out?—Yes, just as they have been. I should propose to give a certain number of orders; the only difference that I should make would be, that if one contractor had finished his orders before

before the others, he should not have to wait while the other contractors were completing their orders.

7648. The present plan of letting one contractor stand still because there happens to be one idle contractor, causes great injury to the men, does it not?—I have heard the contractors complain of it, and the men too.

7649. Mr. *Monsell.*] That arises from the fact that the barrels are sometimes finished before the locks, and the locks before the ramrods?—No; one contractor for barrels finishes his contract before another contractor for barrels, and has to wait till that other contractor has finished also.

7650. Mr. *Muntz.*] That holds good throughout the whole proceeding, does it not; when one man has a contract with others, one having finished his contract and another not, the one who has finished, with his men, stands still till the other has finished?—That, I believe, is the custom.

7651. There is a delay in consequence with the men who have done their work?—Yes.

7652. Might not that lead to one contractor trying to take away the other contractor's men?—Does the Honourable Member mean that one contractor with the Board of Ordnance, upon the delivery of his first quantity, would try to get a fellow-contractor's men?

7653. How would he avoid that?—In this way; if anything of that kind happened, it would be in the power of the inspector of small arms to apply to the Board, and not to give the contractor who had done so a fresh order.

7654. As a punishment for his conduct?—Yes; that would prevent any unfair tampering with each other's workmen.

7655. Should you propose any alteration in the present staff of viewers, or the mode of viewing?—No, I think that the mode of viewing is just what it should be; I mean that the staff should consist of an inspector, a head viewer, and sub-viewers. The sub-viewers cannot be too particular, and if they find that there is anything they have a doubt about, the head viewer ought to take the responsibility upon himself, and put his own mark upon it.

7656. Suppose that the contractors cannot get their work viewed as quickly as they want it, does not that retard their proceeding with their contracts?—It would do so; but they must make such an arrangement that whatever time is lost by the Ordnance not viewing their work must be deducted from the time of their contract, and then the delay is simply with the Ordnance.

7657. Still that would prevent the supply from being equal to what was wanted?—Yes; still that would be the fault of the Ordnance, and it would not fall upon the contractors.

7658. Supposing a contractor were behindhand, what remedy do you propose?—I would propose that he should not have another order; if he could not complete his order within a reasonable time I should conclude that it had better be given to some other contractor.

7659. What is your opinion with respect to the publicity of the contracts; is it a good thing that every contract, and everything done between the masters and the Board of Ordnance, should be made public?—I think it better to keep it private, and merely to give notes of quantity in Birmingham; all communication between the contractors and the Board with regard to payment had better be made from the Ordnance-office in London.

7660. Are there not many of the materials now supplied by working men?—Yes, a great many contracts, I believe, have been given to small masters.

7661. The effect of that I presume is, that they sometimes neglect the Ordnance work, and do the work that they get paid for weekly?—That is constantly the case.

7662. How long has it been the case to give contracts to small masters?—Since the tenders were thrown open for competition.

7663. Many who had not that sort of means requisite to undertake a contract were employed?—Yes.

7664. Have you heard any good reason why the Ordnance should buy the parts of a musket separately?—The only reason that I have ever heard is, that the contractor requires very much less capital, and that the Ordnance buying the material saves the contractor the capital which he would lay out of hand till the musket is finished.

7665. That relieves the setters up of a part of their expenditure?—Yes, they do not require so much capital. That is the only argument that I have ever

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heard for departing from the usual mode of obtaining everything, which is contracting for it entire.

7666. Did you ever hear anything with regard to the 28,000 Minié muskets, the sights of which were deficient sights?—I know that the sights were put on wrong.

7667. Did you know the cause of that?—I believe that the back sight had been put on without reference to the fore-sight; it might have been put on on the centre of the barrel.

7668. If the manufacturers had been responsible for the entire musket, would that have happened?—Certainly not; they would have taken care that the sight had been put on right.

7669. Did not they attempt in that case to take care to prevent it?—They told the inspector of small arms of it at the time.

7670. And he refused to make any alteration, did he not?—He said that the thing was perfectly correct.

7671. Have you ever heard that he told the manufacturers that the soldier would turn the gun a little on one side to avoid the difficulty?—Yes.

7672. Mr. *Monsell*]. Did you hear him say that?—Yes; he has told me so constantly himself.

7673. Colonel *Lindsay.*] Who said that?—Mr. Lovell; he meant to say that, if the sights were put on a little on one side the barrel, you had only to twist the musket, so that if the sights were put on on the right side you would have to twist it round to the left. If the two sights had been put on accurately with reference to one another, that would have been the case; but in some cases the back sight was on the right-hand side, and the fore sight was on the left; the sights were wrong with reference to one another.

7674. Mr. *Monsell.*] He acknowledged the error, and thought that it ought not to be corrected?—Yes, he acknowledged the error, and said that it did not matter.

7675. *Chairman.*] Could you shoot correctly with such a musket?—No; I found that none of them shot correctly.

7676. Mr. *Muntz.*] Do you think that such a thing would ever happen in any private establishment?—I do not think it is possible.

7677. Do you anticipate that in case any alteration was made in the system of contract, there would be any difficulty with the material manufacturers?—I think that they would much rather deal directly with the Government; but I know that they are all so willing to do everything to assist the Government, that they would come into anything that the Government proposed; it is the case with every one that I have seen on the subject, both masters and men; their only wish is to help the Government to get arms in the best and quickest mode they can.

7678. How do foreign Governments contract when they order arms?—For the arm complete.

7679. From your knowledge of the trade, do you think that they find any difficulty?—I do not think that they find the least difficulty.

7680. Mr. *Monsell.*] Are not their arms inferior?—Yes.

7681. Mr. *Muntz.*] That is a mere question of time?—Yes.

7682. Supposing that they wanted guns of equal quality with the present guns, do you think that any man of business, any merchant being a man of business, would find any difficulty in obtaining them?—A little at first he might, because the trade has been so disorganised for want of orders to go on with; but that would not last long; there is no want of power.

7683. What is your opinion as to the state of the trade in Birmingham; is the gun trade as forward as other trades, or has it run to ruin?—I think that if they had only got some continuous contracts, they could get up the work in just as good a way as any other trade could, and as cheaply.

7684. Mr. *Monsell.*] Do you think that the gun trade is as forward as other trades in this country are?—I do not think it is; I think that they might have some improved machinery, and improved means of getting up arms.

7685. Mr. *Muntz.*] Do you mean to say that any great increase in the quantity of machinery could be made with advantage?—No; but I think they might have rather better kind of machinery than they have.

7686. Still the principle of the machinery would be the same?—Yes; I think that nearly as much as can be done profitably by machinery is now done.

7687. Do you recommend or not an increase of machinery to be applied to the gun trade?—I do not think that you can do a great deal more than is already done; part of the stock, I have no doubt, might be done.

7688. Mr. *Monsell.*] With regard to bayonets, what is your opinion?—I have no doubt that more could be done to them by machinery.

7689. Lord *Seymour.*] Could a bayonet be made by machinery?—Not entirely, but it may be done more by machinery than now.

7690. Mr. *Muntz.*] Did you ever see any guns stocked by machinery?—No.

7691. Have you any idea as to the waste that takes place in stocking by machinery?—No; I have always heard that a great deal of waste takes place.

7692. Was the cause explained to you?—I have heard that our wood is more brittle than that used in America, and that you cannot make the same good work as you can by hand.

7693. Supposing that you as a merchant were applied to for a large quantity of arms, take the quality to be as good as those that are now made for the Board of Ordnance, should you have any difficulty in undertaking the contract to almost any extent?—I do not think that I should; I would not like to say that I could do it till I had consulted with the people in the trade; I should not hesitate to undertake it if they were willing.

7694. Mr. *Monsell.*] What do you mean by a great number?—Fifty thousand in the first year or 15 months, and then 100,000 in the second; and if you wanted 150,000 or 200,000 in the third year, I have no doubt that you could get them.

7695. Mr. *Muntz.*] In that case you would enter into contracts with different manufacturers, would you not?—Just the same as any merchant would.

7696. You would consider it desirable, would you not, before doing so, to go and see all their establishments and judge of their capability?—That would be the first thing, I should do.

7697. You would not enter into the contract till you had done so?—No.

7698. Supposing it was a very large contract, you would not be satisfied with what the contractors said; you would judge for yourself?—I should go and see all the manufacturers, and judge for myself.

7699. Mr. *Monsell.*] Supposing that you had a contract for 50,000 muskets for the first year, and 100,000 in the second year, will you describe what you would do?—I should go to the principal gunmakers and ask them what their powers were, and what they would undertake.

7700. Lord *Seymour.*] Would you go to the setters-up?—Yes, the contractors; they are also gun-makers; they would undertake the whole musket, and I would find out what they could each of them do.

7701. Mr. *Monsell.*] You would divide your contract among the different setters-up?—Yes, according to what their powers of production were.

7702. You would then leave it to them to get the materials in the best way they could?—Yes, everything in the best way they could.

7703. Would you have precisely the same view as there is now?—Yes, precisely the same.

7704. All the different parts of the musket would be brought, in the same stages as they are now, and brought to the same place, and viewed by the same persons?—Yes.

7705. The only difference, so far as I understand, between your system and that which is now adopted is, that instead of the Ordnance providing the different materials for themselves, you would leave that to the setters-up to be done by them?—Yes.

7706. Mr. *Newdegate.*] If I understand you rightly, what you would do is this: by imposing a heavier responsibility upon the contractor for the complete arm, you would engage his interest, his intellect, and his knowledge of the trade in the production of that arm, so as to relieve the Board of Ordnance from that part of the responsibility?—Yes; that is the principal object of contracting for the whole arm; I think that the Board now take that responsibility upon themselves which ought to be on the contractors.

7707. Mr. *Monsell.*] You think that the contractors would deal better with the makers of materials than the Board does, do you?—I think that they would have many more facilities, and that they would be able to arrange with them better; if they found a material maker was behindhand they could see what was the reason, and make suggestions about improvements in his mode of production.

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7708. Mr. *Muntz.*] Supposing that you contracted for a supply of guns in this way, and you found that they were not produced to the extent, or with the rapidity that you required, what should you do?—I should go and see what was the cause of those contracts being behindhand.

7709. Supposing they complained that it was the fault of the material maker, what should you do then?—I should go to the material maker myself, and see what his powers of production were; and if I found it of no use doing anything with him, I should recommend the contractor going to somebody else, as he was not a fit and proper person to make the materials.

7710. Supposing that there was nobody else to go to, what would you do then?—I should not much fear that; the contractor must make his own arrangements about that.

7711. Would he be obliged to make them himself?—If the material maker did not supply him well; but there is no fear of that; there are plenty of material makers in Birmingham, if they were only put upon a proper footing, and properly looked up.

7712. If there were not plenty of material makers in Birmingham, and you found a difficulty in getting your guns, you would not be long finding the materials, would you?—There are plenty of people with capital who would set up as material makers; there would be no difficulty about that.

7713. You feel, do you not, that you could do that better than the Board of Ordnance could do it?—It is the business of any contractor to attend to those things, and he must have much greater knowledge of the mode of doing that business than the Board of Ordnance.

7714. You stated just now that you thought some increase in machinery might be made to advantage in manufacturing guns; can you form any idea as to what per centage of the work in manufacturing a gun could be done by machinery, and what per centage could be done by hand?—I do not know that.

7715. The question had reference to rifles?—I know that some parts of the lock can be done by machinery; nearly the whole of the barrel, I think, and so far as I have been informed, some parts of the stocking, the letting in of the barrel particularly.

7716. Nearly the whole of the barrel is done now by machinery, is it not?—Yes; as much machinery is applied to the barrel, I think, as can be done profitably.

7717. You think still that some improvement might be made in the machinery for making locks?—Yes, machinery might be used to a greater extent.

7718. Evidence has been given as to the necessity and possibility of making guns by machinery so rapidly and cheaply as they were never made before, and that all the parts should interchange precisely when done; what is your opinion upon that point?—I think that it is simply impossible.

7719. Suppose it possible, what would be the extra cost of the gun?—I think it is difficult to tell; if all those things were made to fit that were possible, the extra cost would be very great; the pins would be impossible; you could not make one breech pin to fit two guns.

7720. They might fit by accident?—Such a thing might occur; but you could not make the breech pins and the other pins to fit the guns at all, unless you had a countersunk heading, and did not mind where the slit of the screw came.

7721. Have you seen some of Colonel Colt's pistols?—Yes.

7722. Have you ever taken one to pieces?—Yes, a great many.

7723. What is your opinion of the quality of the work?—I think it is inferior.

7724. Is it to be compared to the work in the present rifle musket?—It is not nearly so good.

7725. That article is the groundwork upon which it is presumed that this great advantage of reversing is to be obtained; are you of opinion that such is the fact, and that Colonel Colt's pistols will reverse?—I have had six or eight of them since this Committee has been sitting, and there are no two parts that will change round, not even the pins, which might easily be done in this case; the only parts that are at all near are the cylinders; no other parts will interchange.

7726. Have you ever been in Colonel Colt's manufactory?—No.

7727. Can

7727. Can you judge from the work that you saw in those pistols as to how far hand labour has been applied after the machinery has done its work?—No, I cannot; but evidently the parts have been fitted after they have been done by machinery.

7728. By skilled labour?—Yes.

7729. Have you ever employed men at 2*s.* a day in your manufactory?—Never; the apprentices, I believe, get that.

7730. You do not set apprentices to finish the best guns?—No.

7731. From your experience of labour, both skilled and unskilled, do you think it possible that any man that has never been used to the gun trade, but has been taken from the plough-tail, could be made, under any circumstances, in 12 months, to do the skilled labour requisite to finish a good gun?—I do not think it possible.

7732. Mr. *Monsell.*] Do you think that he could be made capable of superintending a machine in that time?—That depends very much upon what the machine is; unless I saw it, I could not tell you.

7733. That was Colonel Colt's statement; and I wish to know whether you apply your evidence to his statement or to the statement of the Honourable Member for Birmingham?—It all depends upon the machine.

7734. Supposing it to be a self-acting machine?—Some of them require great nicety in adjusting, and others require little or none.

7735. When you speak of the inferiority of the work in Colonel Colt's pistol, do you apply that to the whole of the pistol, or only to the lock?—To the arrangements of the lock, the roller, and the straight mainspring.

7736. Do you allude merely to those parts or to all the parts of the pistol?—The whole of the barrel is very well done, and, I believe, entirely by machinery; I have seen many of them not well done; they are not alike, and different in bore.

7737. Mr. *Muntz.*] They are not bored to the same plug?—Not exactly; if they are they do not fit it.

7738. Did you hear the evidence given yesterday by a man who had been in Colonel Colt's employ?—No.

7739. With regard to the present state of the gun trade in Birmingham, both as to the quantity of means and the number of workmen applicable to the trade, or who might be brought into the trade in case of an extended demand, what is your opinion?—I think that there is great power of bringing fresh hands into the trade, and of getting the old ones back again.

7740. Do you know anything as to the state of the London trade in that respect?—I believe that the London trade have great power of increasing their means of production; a great number of their hands have gone away, but if they had orders, they could get them back again.

7741. Have you ever done anything for the East India Company?—Never.

7742. Do you know Colonel Bonner?—Yes.

7743. Did you hear him give evidence before this Committee?—Yes.

7744. You heard that he was always ready to superintend everything and to rectify everything that was wrong?—Yes.

7745. Do not you think that their success in obtaining their arms arose principally from that circumstance?—Yes; I have no doubt of it.

7746. Do not you think that if the same sort of practice, and the same spirit, had been exercised by the Board of Ordnance in Birmingham, very different results would have been produced?—I think that if they had had an inspector willing to meet the wishes of the Board of Ordnance, and if he had been inclined to do all that he could to facilitate the production of arms, those difficulties would not have arisen.

7747. Referring again to Mr. Lovell; do you know him?—Yes, I know him.

7748. Do you know what the universal feeling in Birmingham with the trade, both masters and men, was, with regard to him?—Yes; I know that they thought he was very much too particular, and that he was rather trying to stop the trade from producing the quantity of arms required.

7749. Do not you know, from coming so often in contact with the trade, that Mr. Lovell's conduct appeared to evince a distinct disposition to prejudice the Birmingham trade?—That was the general feeling; and it had that effect, whatever the intention was.

7750. *Chairman.*] Did you consider Mr. Lovell's inspection too severe?—I have

Mr. *W. Richards.* I have never had to send anything there; I have no personal knowledge of it; it is merely what I have heard the contractors say themselves.

7 April 1854. 7751. In saying that Mr. Lovell's inspection was too severe, you speak only from hearsay?—Yes; upon what I have heard others complain of.

7752. Mr. *Newdegate.*] You have within the last two years made it your business to inquire into the state of the trade, have you not?—Yes.

7753. It is the result of those inquires which you now give, when you state that the effect of Mr. Lovell's conduct as inspector was to stop production?—It had that effect.

7754. Mr. *Monsell.*] Still, whether he was too strict or not, is a matter that you cannot speak to?—They never brought things to me for reference, so that I cannot speak from experience.

7755. Of course, a person placed in rather an invidious position, having to decide upon all the different parts of the musket that were brought before him, would be liable to misrepresentations?—Yes.

7756. Colonel *Boldero.*] There are several gentlemen engaged in the gun trade, are there not, who never take a contract, either from the Ordnance or from the East India Company?—Yes.

7757. Is it your opinion that, in the event of this war continuing, and the Government wanting in 12 or 18 months a large supply of arms, those private gun makers engaged in the private trade would turn all their hands, and give all their exertions to get up a large number of arms for the Government?—I feel satisfied that they would give the Government every assistance.

7758. The whole trade would do it, would they not?—I am quite sure they would.

7759. Mr. *Newdegate.*] What is the nature of the trade in which your father's firm, with which you are connected, is engaged?—Mine is simply the best fowling-pieces; the best guns, not military guns.

7760. But your firm makes rifles also?—Yes.

7761. Since your father's firm has been under his control, have not the prices of the best guns been very much reduced as he has produced them?—No; the prices of our guns have been the same in the last 30 or 40 years.

7762. But the prices of your guns are not so high as the prices of the best guns in London?—No. When Mr. Richards originally arranged his prices, he adopted the principle of making many guns and getting less profit, instead of few guns with a high profit, and he succeeded in it.

7763. The consequence has been that your firm has one of the largest, if not the most extended foreign trade, of any firm dealing in the best guns?—Entirely in the best guns: we do very little in the common guns, in comparison.

7764. That extended trade, particularly to India, has given your firm a wider opportunity of judging of the effect of the rifles used in shooting large game than any other firm?—Yes, we have had a great deal of experience in rifles for animal shooting in India.

7765. That experience you brought in aid of the Board of Ordnance in supplying muskets?—Yes.

7766. Mr. *Monsell.*] Those are first-class rifles, are they not?—Yes.

7767. Mr. *Newdegate.*] How long have you been engaged in assisting the Board of Ordnance?—A little more than two years I have been making the experiments.

7768. What has been the inducement to you to undertake to offer that assistance?—I did it simply to give the Board of Ordnance every assistance that I could; I had experience about rifle-shooting, and my only object was to help them in every way I was able.

7769. Have you received any remuneration?—No; I do not wish to receive any; they offered to pay me any expenses I had incurred.

7770. May I ask whether you know the Enfield pattern musket?—Yes.

7771. Is it similar to those muskets which you finally recommended to the Board of Ordnance?—There are some parts of it similar; the lock is similar, and the bore I think is the same, and the rifling.

7772. Is the improved construction of the stock similar?—Not exactly; it is in some measure.

7773. You mentioned that you contracted for and supplied some sights to the Board of Ordnance; were those eventually rejected?—No; the sights were

not

not rejected; they were put to 500 muskets on trial, but they have not been adopted for the 20,000 muskets now making.

7774. What was the reason that those were not adopted?—I had not any reason given to me.

7775. Is there a similarity between the sights now adopted, and those that you recommended?—No; the only similarity is the slide, and the sight turning both ways.

7776. Have you any knowledge of where those sights were found to fail?—I only hear that they were not sufficiently strong when they were up; they moved a little; that is, were unsteady.

7777. Do you know the reason of that?—I believe one of the reasons was, that they softened the sights after they were made.

7778. For what purpose?—To mark them.

7779. By that means they rendered the sights incapable of wearing?—I have not seen them since; those that I did see were certainly injured by the softening.

7780. To that reason you attribute their failure?—I do not know what their reasons were; they might have had other reasons for not going on with the sight.

7781. But that reason was sufficient to account for the failure?—Yes, it was sufficient to account for the sight not standing up in its proper place.

7782. Do you consider that in essentials the Enfield pattern is so far perfect as to justify the Government in continuing to produce arms upon that pattern?—My own opinion is, that the bands of the Enfield musket might be improved; I think it will be found, when they come into service, that the screws will be very objectionable; I think that the screw-heads will get damaged, and that they will be forgotten very often to be screwed up into their places.

7783. You prefer bands more similar to those adopted by the French Government and the Belgian Government?—I prefer a solid band with a spring; the top band the same as the lower and middle bands, only a trifle wider.

7784. Is there any other particular in which you think that the Enfield musket can be improved?—I think that the rod is not perfect.

7785. If I understand you rightly, they are not the essential portions of the musket which need alteration, and not such as need prevent the Government proceeding to order a large quantity?—No.

7786. The result of your evidence is, that in your opinion the small arms committee of the Government have decided upon such a pattern that they might at once proceed to issue contracts for a large supply for the army?—I think so, if they themselves are perfectly satisfied that the diameter of the bore is large enough.

7787. If they are satisfied upon that point, there is now no impediment to their proceeding at once to procure a large quantity for the service of the country?—I know of none.

7788. In speaking of contracts, you have recommended that there should be a single contract for the whole arm, and that the system of view should be continued?—Yes.

7789. Do you recommend the appointment of an impartial and well qualified arbitrator in the event of disputes between the contractors and the Board of Ordnance, or between the contractors and the viewers?—I think it would be a great advantage, in case a contractor thought the inspector had rejected anything unnecessarily, that he should have the power of referring it to arbitration.

7790. Do not you think it advisable that a small number of scientific and well qualified persons should be appointed, to whom reference should be made by the small arms committee when they are deciding upon any change of pattern, or the adoption of any new invention?—I think it would be a great advantage to them, and would very often save them from fixing upon a pattern which was expensive to make, as in the case of the last musket. I think that they expended a great deal more money on the bayonet, the lock, and the outside of the barrel than was necessary, and too little money on the inside of the barrel and rifling.

7791. The inside of the rifle is the part essential to the shooting and the efficiency of the arm, is it not?—I consider it the most essential part of the whole musket.

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7792. You think that if persons who had been trained during their whole lives to the making of guns and arms had been in a position to advise the small arms committee, those errors might have been avoided, and many of the difficulties obviated?—I think there is no doubt about it.

7793. Are you aware that in France and in America the knowledge and experience of civilians engaged in manufacturing arms is brought to the assistance of the military authorities employed by the respective Governments of those countries?—I have heard that it is.

7794. Is there an Ordnance department in which civilians are included in France?—Yes, I believe there is.

7795. Is it not the fact that, in the United States, engineers who are employed by the Government are constantly, when not engaged in military business, employed for civil purposes?—I believe they act as civil engineers as well as military.

7796. And therefore they combine the knowledge of civil engineers as well as of military engineers, and a considerable knowledge of trade?—Yes.

7797. Mr. *Monsell.*] Is that not the case in England?—I do not think it is so much.

7798. Colonel *Lindsay.*] Are not many of the Royal Engineers employed as civil engineers in different parts of Ireland and England?—Yes.

7799. Mr. *Newdegate.*] But the result is that, in the United States, the knowledge of the private trade is brought to the assistance of the military authorities in the construction of arms?—I do not know whether it is in the United States; I believe it is in France; at least I have always heard so.

7800. Have you heard that the same is done in the United States?—Yes.

7801. Mr. *Monsell.*] Is the French arm better than the English arm?—The French arm used to be better; our arm lately has been very much improved.

7802. You know that a new arm has been made since the small arms committee was appointed?—Yes.

7803. Do you know how that small arms committee is constituted, to whom all those questions are referred?—I believe it is composed of military men.

7804. Have they the assistance of any civilian sitting with them?—That I do not know.

7805. Is it not their habit to obtain advice from yourself, and all the most eminent gunmakers in the kingdom?—Yes.

7806. Therefore they take advantage of all the experience which you are so good as to offer to them?—Yes, certainly.

7807. Mr. *Newdegate.*] Until recently, the Board of Ordnance and the small arms committee have not very extensively consulted the private trade?—I believe they did not do it so much till the last two years.

7808. Mr. *Monsell.*] Until very recently, the small arms committee did not exist?—That I was not aware of; I had nothing to do with it till the last two years.

7809. Mr. *Newdegate.*] Can you state whether the improvement of the musket in France did not precede the improvement of the musket in England?—They had the rifle musket in France before we had it in England.

7810. Therefore the great improvement of late years, namely, the adoption of the system of the Minié rifle musket, originated with the French Government, in a French department?—It was used there before it was here; I do not know whether it originated in France or Belgium.

7811. It was adopted in France before it was adopted in England?—Yes.

7812. Mr. *Monsell.*] Do you think that it was adopted quite as soon in England as it ought to have been?—Yes, quite as soon.

7813. It would have been imprudent on the part of the English Government to adopt it, without taking all the steps that were necessary to ascertain its advisability?—Yes.

7814. Mr. *Newdegate.*] Is it not your opinion that if the information which was possessed by the French Government as to this invention had been earlier received in England, the improvement of the musket might have been adopted earlier in England?—I think that, if the same means had been taken five or six years ago, they might have got the information then, just as well as they did a year or two years ago.

7815. They might have got it as soon, if not before the Government of France, might

might they not?—I do not see any reason why they should not have got it quite as soon; I think sooner.

7816. You have stated that the gun trade in this country is not so far advanced as other trades; is not the gun trade of England, so far as quality is concerned, in advance of the gun trades of other countries?—Very much, I should say, in best guns.

7817. In the export trade generally, in all classes of guns, does not the gun trade of England compete successfully with the gun trade of other countries?—Yes, it is in a state to compete with the gun trade of any other country.

7818. And the superiority of the English guns consists in the quality, does it not?—In the best guns their superiority does, certainly. I do not think that there is any other country that can make the best guns as we can in England.

7819. That is the result of your experience as connected with a firm which has an extensive export trade?—Yes.

7820. When you stated that, if you had a contract for 50,000 or 100,000 muskets, you would make certain arrangements with other contractors, did you contemplate that a contract to the extent of 50,000 or 100,000 should be given to any one contractor?—No.

7821. You stated that number of muskets merely by way of illustration?—Simply that I thought it was in the power of the trade to produce it. I did not say how they would best produce it.

7822. You would not recommend that the Ordnance should proceed to contract with one firm for 50,000 or 100,000 muskets, but for a smaller quantity?—I think it better to have a number of contractors.

7823. And to divide among them the number required?—Yes, I think so.

7824. What is your opinion of the establishment of a Government manufactory for the production of the whole, or the greater part, of the arms required for the public service, as compared with employing the trade of this country as the Government have done hitherto. Do you think that the supersession of the trade of this country by a Government manufactory is advisable?—I do not think that the Government could ever manufacture arms to the same advantage as private individuals could; they must do it at much greater cost.

7825. Do not you think that those who have been brought up to the trade of arms making, and have spent their lives in the trade of arms making, and whose intellect has been sharpened by competition, are more likely to produce arms efficiently and cheaply than those who are only employed in after life for that purpose?—I think there cannot be a doubt about it; no one, except those who have been in the arms trade all their lives, can have that perfect knowledge which it requires.

7826. What is the reason of that; is it not that it is a trade in which a knowledge of handicraft and of metals is essential to success?—I think that the reason is the same as in all other cases; there is nothing but practical experience will give you the knowledge that is sufficient to produce anything at the lowest possible cost. I do not think that any irresponsible person, or any Government officer who is not responsible for the cost, and who does not in some measure himself benefit by the cost, could ever be so sensitive of profit and loss as a private individual.

7827. And the same reasons apply to quality, do they not, that a man who depends for his livelihood upon the quality as well as the price of his goods, will be more likely to produce a high quality than those who are not so dependent?—He will be a much better judge of the quality, and how to produce it.

7828. Mr. *Muntz.*] Did you ever know of any Government who considered the question of profit or loss?—I do not know; I have had no experience.

7829. Mr. *Monsell.*] Do you know anything about the Royal Carriage Department at Woolwich?—No; I have seen it. I knew Colonel Colquhoun.

7830. Have you seen the machinery there?—Yes.

7831. Does it appear to you to be a well-managed manufactory, and do you think that all the people that manage it are sensitive as to profit and loss, and are good judges as to the quality of the thing produced?—They have no means of telling, because they do not sell it.

7832. Do not they provide articles for the East India Company, and arrange the price with them for the articles so provided?—Then the East India Company have no means of testing the relative value; there is no one to

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compete with; it is not like a common article of consumption; where you have got an exceptional case of that kind, such as gun-carriages, I do not think it applies in the same way as an arm does.

7833. But the East India Company are probably sensitive to profit and loss, and if they could get them cheaper and as good at any other place, they would do so?—They are not in regular demand; it is not a thing that is made for public use; it is an especial case.

7834. There are a very considerable number of men employed in the Royal Carriage Department, are there not?—Yes.

7835. Why is it not worth the while of private individuals to compete with it?—I do not know much about the Royal Carriage Department; I know that it is not a thing of general consumption.

7836. Your opinion is merely an abstract opinion as to Government establishments?—It is an abstract opinion.

7837. Mr. *Geach.*] Is it not the case that in the gun-carriage manufactory at Woolwich, the only other customer besides the Government being the East India Company, no man will set up an establishment with a chance of getting that one customer?—They will not.

7838. Therefore, there is no competition?—No.

7839. Mr. *Newdegate.*] That constitutes an exceptional case?—Yes.

7840. Mr. *Muntz.* Did you state that you had been to see the carriage department?—Yes; I saw it last year, or the year before.

7841. You do not pretend to be a mechanic, do you; I know something of mechanics.

7842. Suppose any one came and asked you to set up a series of machines to manufacture what is manufactured there, you would not consider yourself *au fait* at it?—I do not know sufficient about machinery to enable me to give an opinion as to the best mode of doing it; I saw several things that appeared to be done in a more expensive manner than a private person would have done them.

7843. Supposing any individual were to adopt the same means that the Board of Ordnance have thought proper to apply to the carriage department, he would have just the same means of manufacturing as the Board of Ordnance, would he not?—Yes, but he would not go in so expensive a way to work.

7844. Is there anything in the manufacture of a gun-carriage that anybody cannot do?—No.

7845. How much per cent. do you think any individual would undermanufacture the Board of Ordnance?—I have no means of going into the calculation.

7846. Mr. *Newdegate.*] Do you know that the iron guns for the service are manufactured by contract?—I believe they are manufactured by contract.

7847. You believe that that system is successful in the supply of iron cannon?—Yes, I have heard that it is.

7848. Reverting to the question of small arms, will you state whether you do not think that the existence of the arms trade in any country is a great advantage and resource to the Government of that country, in a national point of view?—I think there cannot be a doubt about it.

7849. In what respects?—I think that wherever there is an existing trade of that kind, and we manufacture for foreign governments, we can, in time of war, help our allies; and also, we can, in time of war, to some extent, stop the supply of our enemies.

7850. If, therefore, the Government of the country encourage the arms trade of the country, they not only obtain a supply for themselves, but they exercise a control over the supply of foreign countries in case of need?—To some extent they do.

7851. Have you heard that that has been found to be the case in the manufacture of gunpowder?—No, I have not.

7952. Mr. *Geach.*] You know the gun trade perfectly, do you not?—Yes.

7853. Supposing you had to make, in the course of time, 900,000 stand of arms, and you know what can be done in the trade now, and you are a person of unlimited means, and it was recommended to you to lay out 150,000 *l.*, for the purpose of producing those arms, and in doing so you had to apply machinery to a much larger extent than it has been already applied, would you consider the outlay

outlay of that 150,000 *l.* a judicious proceeding?—I should think it very injudicious and unnecessary; and I think that I could procure the arms without that outlay, and at a less cost.

7854. You might find, in fact, when you had laid out 150,000 *l.* in erecting a manufactory and preparing new machines, that it might be better for you to avail yourself of the knowledge of a great number of parties, and of the capital and skill of those parties in producing the arms at a less cost?—I think it would be done to much greater advantage by applying to private persons in the trade.

7855. Do you believe that 150,000 stand of arms, of such as the Government have been in the habit of receiving, altered in some non-essential matters to enable it to be manufactured better by machinery, could be produced for 140,000 *l.*?—Certainly not; that is taking it at less than 1 *l.* a piece; certainly not, of the same quality.

7856. Including interest, machinery, and all?—Certainly not, of the same quality.

7857. Mr. *Muntz.*] Have you any idea of what they could be reduced to by good arrangements and consecutive orders?—If the Ordnance would give up a few things which are not essential, I think the musket might be very well reduced 10 *s.*

7858. Will you specify those things that might be given up without disadvantage?—I should not spend 7 *s.* on the bayonet; the only two things that you want about it are lightness and strength, and I think that a bayonet equal in quality would be got for about 4 *s.* 6 *d.* or 5 *s.*

7859. That is a saving of about 2 *s.* 6 *d.*?—I think that a lock, sufficient for all purposes, might be obtained for 5 *s.* 6 *d.* or 6 *s.*

7860. What is it now?—Eight shillings and three-pence.

7861. Say another 2 *s.* 6 *d.* for the lock, that makes 5 *s.*?—Then I think there is 1 *s.* 9 *d.* or 2 *s.* expended on the outside of the barrel which is perfectly useless.

7862. Is there anything else?—I do not know whether there is anything else. I think you may save a little in the stocking if you are satisfied with a slightly inferior gun.

7863. What would the reduction be in the stocking?—I have no doubt that there may be 1 *s.* 6 *d.* saved. The Honourable Member is not now speaking of a gun equal in quality.

7864. Yes, equal in quality for all useful purposes?—That would bring it down to little better than the extra-service gun.

7865. That difference might be made?—Yes; I could give the Committee the price that the extra-service gun could be made for.

7866. What is the present price of the musket?—About 3 *l.* 5 *s.*; this gun might be reduced without injuring the quality at all.

7867. That would bring it down to 2 *l.* 17 *s.*?—Yes.

7868. Colonel *Dunne.*] You stated that the price should be settled by the Board of Ordnance before entering into contract?—Yes.

7869. You mean by the Board of Ordnance or the Small Arms Committee?—Yes.

7870. Do you not think that the Small Arms Committee would be obliged to put themselves in communication with some one acquainted with the trade in Birmingham?—Yes.

7871. Have you paid a good deal of attention to the Enfield musket?—Yes.

7872. Did not you think that the bore of that musket was rather small?—I think that, for a target-gun, that musket is perfect, but for service I think it is too small.

7873. The bore of it is ·577?—Yes.

7874. What size would you recommend it to be?—I think that you might get up to about ·620, with an increase of 60 to 70 grains in weight of projectile, and four ounces in the musket.

7875. Do you think that that would make any perceptible difference in the weight of the 60 rounds of ammunition which the soldier is supposed to carry?—It would be 60 times 70 grains.

7876. You consider, do you not, that the ramrod is not so serviceable as it might be?—It is not so convenient as it might be.

7877. Is it liable in wet weather to swell and jam?—I think the close groove is certainly very liable to swell, and the swell of the rod is imbedded in the wood; I should propose to change that.

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7878. You also think that the bayonet might be made equally efficient and less expensive?—Yes, I think so.

7879. Do not you think that there is a possibility of further improvement in these arms; that in fact discoveries are made every day, and that it is very probable that the arms we have will be further improved?—I think it is very likely.

7880. Would it not then be very unwise for the Ordnance to issue any very large contract for that musket which is now considered the pattern musket?——For that particular musket they might issue a contract, subject to any alteration.

7881. Would you not recommend the revision of that musket for two purposes; first, to consider the improvements which you have suggested, and next, to adopt an arm which, though not externally so finished, should be equally serviceable and cheaper?—I think it would be wise to do so.

7882. Do not you think, as to the inside of the musket, we have not attained that perfection which might be attained?—I think that there is a great deal more to be done as to the shape of the rifle barrel inside.

7883. Therefore it would be prudent in the Board to consult with scientific men as to the improvement in the inside of the musket?—I think the principle you are working upon ought to be settled as far as it can.

7884. You have examined several of Colonel Colt's revolving pistols; do you think that there is any arm of that kind that is not almost certain to be improved?—I have not seen any revolving pistol that is perfect. I have no doubt that there may be improvements made in them.

7885. You think that upon the musket at least 8*s.* 6*d.* might be saved in the price, and that the result might be the manufacture of an arm of equal efficiency to the Enfield musket, No. 3?—I think so, certainly.

7886. Mr. *Newdegate.*] You recommend, do you not, an experimental department being established by the Government?—I think that would be of great use to the Government; there are a number of professional projectors who are always taking plans and propositions to the Government, who have not the means of knowing whether those things are worth trying. I think that somebody of that kind would at once discover whether a thing had merit, and would say whether any expense should be gone to in trials.

7887. Do you think that it would be preferable to have experiments made in machinery, or the application of machinery to small arms, at Enfield or at Woolwich?—I think Enfield would be the best place; you have a building there, and it is quieter there, and more convenient to try experiments of that kind.

7888. And liable to less interruption?—Yes; it is not always convenient to let every one know what you are doing; foreigners, I mean.

7889. What kind of outlay do you think would be necessary to increase the establishment at Enfield, so as to adapt it for an experimental department?—I do not know. Mr. Whitworth's account of the stocking machine was 5,000*l.*

7890. Then 5,000*l.* or 10,000*l.* expended at Enfield would furnish the Government with a useful experimental department?—I think so, to begin with; it would be better to begin by degrees, and not do too much at first.

7891. Colonel *Boldero.*] What are the advantages of the present musket of 1853 over the old musket: is not the correctness of the fire one, and the diminution of the weight the other?—It is quite a different arm; it weighs 9¼lbs.; it is much lighter; it is a rifle musket, and makes very good practice at 800 to 1,000 yards.

7892. Though the weight of the musket is reduced, you have increased the weight of the ammunition, the soldier carrying in his cartouch-box 60 rounds?—I think not; you had that in the 28,000 muskets, but not in the pattern of 1853.

7893. Are there any other advantages that the new musket possesses over that of 1842, besides the range and the lightness?—None beyond the range and the lightness; the musket of 1842 is a very good musket.

7894. Is the range longer?—Yes; the Enfield musket of 1842 was a smooth bore, and was of very little use beyond 100 yards.

7895. You are aware of the advantages which the old musket possessed, and which we gave up for the new musket, the wound being more crushing from the old musket than the wound will be from the small bore?—Yes.

7896. We

7896. We also gave up this advantage: if the French ammunition fell into our hands, we could use it, or the Russian ammunition, immediately?—Yes.

7897. But if our ammunition fell into the hands of the enemy, they could not, on the spur of the moment, use it; they must unpack it and re-pack it?—Yes.

7898. There is evidence in that Blue Book, given by Mr. Lovell, showing that the leg of a horse could be broken at a given range with a large bore, whereas the light musket used by foreign armies would just rase the skin; we give up all these advantages, and obtain two by the smaller bore?—Yes.

7899. Taking the advantages on the one side, and the disadvantages on the other, is it your opinion that the ball which is now the one in use should be continued throughout the service, or should it be increased?—I think that you ought to get as large a diameter as you possibly can with the weight; the larger the diameter that you can get the better. As a target gun, I think you have perfection in this size, in the ·577.

7900. Do you think that the present bore ought to be continued?—I think, as a military arm, it is rather too small.

7901. Mr. *Monsell.*] Are you aware that it broke the legs of three cows at 1,000 yards at Woolwich?—That is possible; I shot a calf through the leg, and he did not even go lame after it.

7902. Mr. *Muntz.*] Is not the present Minié ball, in consequence of the extra length, nearly the weight of the old musket ball?—It is 50 grains heavier; the old musket ball was 480, this is 530. In the case of the calf that I shot through the leg, at the top of the leg, I could not even get my finger through the aperture, and the calf was perfectly well in 10 days after.

7903. Do you know how long it is since the French Government adopted the Minié rifle?—The first that I heard of it was about four or five years ago.

7904. Four years ago they had a very large number of troops supplied with it?—I had not seen any of them till then.

7905. Do you know when it was first offered to the Board of Ordnance in this country?—I know that it was some 15 or 20 years ago.

7906. And was repudiated?—Yes. I know that it had been offered.

7907. Do you know when the first experiment was made with it by the Board of Ordnance in this country?—I do not think it is more than three or four years ago, but I had nothing to do with it; I was first applied to in February 1852, at the time that the orders were given out.

7908. That was about the time that a correspondence took place between Sir Charles Shaw and the "Times," was it not?—Yes.

7909. Did you read his letters?—Yes.

7910. It was not at all known in the country at that time?—No; there had been no demand here for long-range rifles.

7911. They were not known to exist?—It was known that you could do it if it was wanted.

7912. Was it known?—Yes; it was known in the private trade that it could be done.

7913. Lord *Seymour.*] From your knowledge of the gun trade, do you think that the Government have been charged an exorbitant price for the present rifle musket of the last pattern?—I do not think they have, for what they required. I think that they have expended too much money on the bayonet, and upon what is simply finish.

7914. On that account, with a view of reducing the price without diminishing the efficiency of the arm, you recommend some revision of the musket?—Yes.

7915. To make that revision effective, you think that it ought to be conducted with the assistance of some practical men, who could speak as to the price?—Yes; I think before anything is finally settled, people who are in the habit of making arms should have them given to them, to let them see what they can make them for.

7916. You have had a great deal of experience in making rifles; have you ever used machines for rifling?—Yes, always.

7917. Are you aware of the foreign machinery, which we have heard is so superior for rifling by progressive grooves?—I know that they do it; but I rifle barrels with progressive grooves by machinery.

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7918. By steam machinery?—No, by hand; I have not sufficient consumption for anything but a hand machine.

7919. If you had sufficient consumption, nothing would be more easy than to apply steam power to the same machine?—It is perfectly easy.

7920. You have spoken about the reduction of price in the stock; would it be advisable to introduce American walnut, with the view of obtaining a cheaper stock?—I have never seen American walnut.

7921. With your knowledge of the gun trade, have you found combinations and strikes among the workmen continually interfering with the progress of the trade?—Personally I never had such a thing; I never had a difference of opinion about prices.

7922. Do you think that that difficulty might be avoided by good arrangements?—I think so; I would have an arrangement between the contractors and the men before any definite contract was entered into with the Board of Ordnance.

7923. You think that the men might be trusted not to raise their price with the contractors, if the prices were fairly considered previously?—I think they might; I do not know enough of the men who manufacture the Ordnance muskets; I believe there have been a good many strikes, but I do not know the details of them.

7924. Mr. *Monsell.*] Your own experience has been altogether in the higher branches of the trade, has it not?—Yes; I never knew such a thing as even a difference about the prices.

7925. Did I understand you correctly, that one of your suggestions for getting rid of the difficulties between the Ordnance Department and whoever supplies muskets to them, with regard to the workmen, would be by getting rid of competition?—I think getting rid of that intense competition would do much to prevent misunderstandings.

7926. Have you had much experience of machinery out of your own trade; have you made it a study?—No; I know something of ordinary machinery: lathes, and everything connected with engines, and the larger kind of machinery.

7927. Are you acquainted with the principles of such things as rifling machinery; have you turned your attention to that subject?—Yes.

7928. The evidence which you have given as to machinery has been founded very much upon what you have observed in your own trade?—Upon what I have observed generally.

7929. Mr. *Newdegate.*] In Birmingham you naturally have brought under your observation a very large amount of machinery?—Yes.

7930. Being one of the principal manufacturing towns in the country?—Yes.

7931. It is also the seat of the largest gun-trade, is it not?—Yes.

7932. And therefore, from having lived many years in that town, which is a large manufacturing town, and the largest seat of the gun trade in the world, you have a general knowledge both of the application of machinery and the relation of the men to the masters?—Yes, I have.

7933. Mr. *Muntz.*] Did you ever come in contact with a machine made some years ago for manufacturing screws?—I did not see it. I heard of a machine that was made in London, and cost something like 500 *l.*; it made wood screws very well. I think that Mr. Whitworth or some other gentleman had been to see it, and in going home again he met with a wood screw manufacturer, who asked him to go and see a machine in Birmingham which he had. This was one that cost about 4 *l.* or 5 *l.* and was worked by a woman; it was timed to do 60 in a minute, while the one in London that cost 500 *l.* was timed to do 30.

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BARREL MAKERS' Complaint of rigid View, and REPORT thereon from Mr. *F. G. Lovell*, Assistant Inspector of Small Arms.

District Works, Smethwick, near Birmingham,
Sir, 27 October 1851.

IN reply to your letter of the 20th, just received on the 23d, we beg very respectfully to acquaint you, for the information of the Right Honourable Board of Ordnance, that we are willing to do all in our power to increase the supplies; but the very rigid inspection the barrels are subjected to precludes the possibility of stating any precise number in a given time. We, in confirmation of which, beg to submit a statement of the deliveries and the quantities received into store, under the contract of the 6th June last, (S—1361), which will show the difficulties we have to contend with.

We are, &c.
G. Butler, Esq. (signed) *Beasleys & Farmer.*

1851:	Number of Barrels sent for View.	Number of Barrels Passed.	Number Rejected.
16 July	112	17	95
23 „	73	32	41
30 „	120	30	90
6 August	119	45	74
13 „	129	34	95
20 „	150	66	64
27 „	130	99	31
3 September	140	68	72
10 „	121	50	71
24 „	150	46	104
1 October	92	29	63
8 „	135	42	93
TOTAL	1,451	558	893

IN reference to the Honourable Board's Minute hereon, and to the letters from the other contractors for barrels enclosed herewith, I beg to observe, the statements put forward by them are entirely erroneous, and calculated to mislead; for instance, Messrs. Beasleys & Farmer would lead the Honourable Board to conclude they had sent in 1,451 new barrels, out of which 893 have been rejected; whereas the same barrels have been frequently

 rejected,

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rejected, four and five, and in some cases as many as ten times, which being carried each time to the column of rejections, swells the real amount.

Again, the greater numbers which are now rejected do not arise from the rigid inspection because the same viewers are employed, and have received similar instructions as for the inspection of the line muskets barrels; but the reason the rejections are more in numbers is, 1stly. Because Mr. Marshall, who makes the barrel iron for the whole of the contractors, with the exception of Messrs. Beasleys & Farmer, who manufacture for themselves, not having had any demand either from the East India Company or the Ordnance for the two past years, has been obliged to seek other markets for his iron, where quantity and not so good a quality was required; and now that the barrel iron is again wanted, has not yet been able to succeed in making it so clear as before.

2dly. The barrel makers, having had no orders for best military barrels for the past 18 months, have been obliged to employ their workmen on store barrels of a very inferior description and price; consequently, now that the workmen are called upon to make the superior article, he finds himself unable to do so without practice, which entails a serious loss upon his master.

It is for these reasons the contractors cannot state the precise numbers they will deliver, and not from the rigid inspection and view.

Small Arm Office, Birmingham,
11 November 1851.

(signed) *Fran^s Geo. Lovell,*
Assistant Inspector of Small Arms.

(A true copy.)
(signed) J. Wood, Secretary.

(E—2487.)

Office of Ordnance, Enfield, 31 March 1852.

A Statement, showing the Number of new Rifle Musket Barrels, in the rolled State, delivered by the Contractors; the Number rejected previous to being put in course of finishing; the Number rejected in the Progress of Completion, distinguishing those rejected for defective Material, and those rejected for faulty Workmanship; and showing the whole Number of Barrels which have been completed, and the Numbers of these which have been rejected on final View and Proof, both for Defects of Material and Faults in Workmanship.

Prepared per Honourable Board's Order, dated 22 March 1852 (O—91).

Number of barrels delivered by the contractors in the rolled state - 5,000

Rejected previous to Proof and final View.	Previous to their being put in course of work -	115	To be replaced by the Contractors.
	In the progress of work for defective material -	156	
	On account of faulty workmanship - - - -	77	

Filed, finished and proved (of the above 5,000 barrels in the rolled state) - - - - - - - - - - - - - 2,500

Rejected after Proof and final View.	Defective material to be replaced by the contractor - - - - - - - -	27
	Faulty workmanship - - - - - -	69

(signed) *R. W. Gunner,*
Storekeeper.

The Honourable Board of Ordnance,
&c. &c. &c.

The line of comparison which the Honourable Board desire cannot be completely carried out, because of the differing circumstances under which the inspection is made.

The very large proportion of rejections at Birmingham is more apparent than real; the work "rejected" in the Return includes barrels sent back to the master for faults of workmanship to be amended; and thus, if these faults be not mended, the same barrel may, and does, fall into the list of rejections several times over. I have directed the account in future to be kept in three columns instead of two, and thus show the numbers "sent back" for amendment distinct from those absolutely rejected.

Another and very potent element of difference arises out of the system under which the manufacture is carried on in the two places. At Enfield no workman is admitted unless he be of the first class in his trade, and of sober, moral, and regular habits. He has the assistance of the best machinery and works under the immediate eye of the viewer, who corrects any errors of work as they arise. He has a comfortable home, and receives his wages in full at a certain hour every week. Whereas at Birmingham, the first and ruling question is price; the man who will work at the lowest rate is entrusted with it, without much

much care as to capability or character; there is little or no tie between him and his master; he is mulcted for the mill-power that he uses and for tools, and receives his wages often very irregularly. The consequence is, that the workmanship is inferior, and the men resort to all sorts of shifts and tricks to evade the viewer's eye. The master complains of the injustice of the inspection, when it is his own fault for employing inferior workmen and screwing them down in price.

(signed) *G. W. Lovell,*
Inspector of Small Arms.

Birmingham, 3 April 1852.

MINUTE of the MASTER-GENERAL.

THE explanation is satisfactory, and shows clearly the difference of the workmanship, and the cause of the superiority at the Enfield manufactory, and would be of use to the clerk of the Ordnance in answering any attack in the House of Commons.

10 April 1852. (initialed) *H.*

(A true copy.)
(signed) J. Wood, Secretary.

MEMORANDUM relative to Small Arms; 18 February 1854.

IN 1803, when the war with France was renewed, the scarcity of arms was so great, and the want of them was so urgent, that the Government had recourse to foreign markets, and bought up all they could obtain. These were bad in quality, cumbrous and heavy in pattern, and comparatively few in number. By great exertion, and by an almost lavish expenditure, the manufacture of arms was so much increased that the volunteers, militia, and regular forces of the kingdom were armed, and a surplus store provided, which enabled the Government of this country to aid the nations of Europe in their deliverance from the subjugation of France. It was the promptness with which supplies of arms were sent to the Peninsula, and to those parts of the Continent where the people rose in opposition to France, that gave success to their efforts, and constituted the powerful aid of this country on the spur of the moment, rather than its wealth.

These arms were, however, of an inferior description, the regular army pattern having been laid aside for others more easily obtained, called the India pattern; and great complaints have at times been made of the bad quality of them. The urgency of the demand prevented attention to quality, and the complaints were in many instances well founded.

At the Peace, in 1815, the manufacture of arms for Government ceased, and the workmen were dispersed. Little was afterwards done with regard to the provision of arms, until the adoption of the percussion principle, when a re-equipment of the army became necessary. The trade had then fallen into a very disjointed state, and there was a difficulty in collecting together men capable of making the new arm in a satisfactory manner. In 1840 the inspector of small arms represented the very unsatisfactory state of affairs; the masters complaining of the workmen, and the workmen of the masters; the lock-filers and the stockers striking for wages; the masters exposed to a serious combination of workmen, and the latter having a fair ground of complaint against the masters; the result being higher prices to the department, or injury to the service by delay. 10 Sept. 1840, (S—1574), Copy herewith). (A.)

Again, in 1842, the inspector of small arms represented the injury to the service, and the high prices, which resulted from the organised combinations both of the masters and men in the gun trade; and in 1848 he further represented the disadvantages of the system then pursued for obtaining arms, and the unnecessary high prices which were paid for them. The opinions the inspector of small arms expressed coincided with those which the Board had previously entertained. They had for some time contemplated the adoption of a different system. In March 1850 they decided upon putting up to competition the supply of the arms then required, by calling for tenders for the several parts of the musket except the stocks, of which there was a store, and then for setting them up. The result showed a great reduction in the cost of the arms; but there was not that free competition which existed in other trades. Many of the tenders were at one price, showing that the parties had acted in concert, and for some articles a price was finally arranged with the parties in lieu of that which they tendered. Great difficulties arose in the execution of the contracts; the setting up was delayed for want of the materials, the lock-filers having struck for wages; and it was also impeded by the very unsettled state of the workmen in the military-gun trade generally. 26 Jan. 1842, (S—1362), Copy herewith. (B.) 16 Dec. 1848, (S—1737). (C.) 17 July 1850, (S—1540). (D.) 12 June 1850, (S—1504). (E.)

In February 1851 the Board were desirous of obtaining a further number of muskets, before the end of the then financial year, 31st March 1851, but were informed by the contractors that there were not workmen enough in the trade to enable them to increase the number they were under engagement to supply. *See* printed notice. (F.) 9 July 1850, (G—648). (G.)

In May 1851 a new pattern rifle musket was adopted for the British Army, and tenders, by competition, were obtained for the supply of the materials requisite, in addition to those in store which were applicable, for setting up 28,000 rifle muskets. Great delays occurred in

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in the supply of the materials, and sufficient were not collected to enable the Board to make contracts for setting up the muskets, until the month of December 1851; and the muskets were not completed until November 1853.

18 March 1852. (H.)

Considerable difficulty was experienced by the contractors in obtaining workmen, in consequence of the opposition made to them by the unsuccessful competitors for the contract, and also in arranging terms with the workmen, who held out for prices which the contractors considered too high.

26 June 1852, (G—758.) (I.) 28 Sept. 1852, (E—2561). (K.)

In January 1853 a new pattern rifle carbine was adopted for the artillery, and contracts were made for the materials for setting them up; but so great has been the difficulty and delay in obtaining them, notwithstanding all the efforts of the Board, that not more than 500 carbines were completed by the end of January 1854.

See printed notices from the newspapers enclosed. (F.) 13 January 1853, (S—2532). (L.) 18 January 1853, (A—2851.) (M.) January and February 1854. (N.) 9 February 1854, (S—3471). (O.)

The rifle musket of 1851 having been superseded in 1853 by another of smaller bore, and somewhat different construction, the Board, in July last, called for tenders for materials for 20,000 muskets of the latter description. The offers received were so unsatisfactory as to price, and evinced so perfect a combination amongst the parties, that they were, after some correspondence, declined; and one of the Board officers, Sir T. Hastings, proceeded to Birmingham, and effected agreements with the parties on better terms; but they have not kept their engagements as to time, assigning as the cause the difficulty of obtaining workmen, and a strike for higher wages. The consequence is, that, up to the present time, the Board have not been able to commence the setting up of the muskets; and though they have made a contract for that purpose, it is uncertain, even if the materials should now come in with regularity, when it will be carried out, from the difficulties which the contractors may again encounter from their workmen.

(signed) *J. Wood*,
Secretary.

(A.)

(S—1574.)

COPY of LETTER from the Inspector of Small Arms, relative to the Progress made in the Preparation of Percussion Arms.

Sir, Small Arm Office, Tower, 10 September 1840.

IN obedience to the Honourable Board's order of 28th ultimo, I beg to forward herewith a statement of the progress made in the preparation of percussion arms from the earliest to the present time, at Enfield, Birmingham, and in London.

Besides the finished arms therein enumerated, there are a considerable number of barrels, locks, and materials for percussion arms already in store, and in progress towards the completion of the numbers in the last column of the return that "remain to be finished."

The prices of setting up these arms have been agreed upon and ratified by the Board, and the work is in full progress. But before I can propose any further orders being issued, it appears to me to be absolutely necessary for the security of the public interests, that a better understanding should be come to with gun contractors, and that the prices of setting up arms should be thoroughly investigated, and regulated upon a more fair and reasonable base than they have hitherto been.

The masters complain of the workmen, and the workmen of the masters; the lock-filers and stockers are now out on a strike for wages, and therefore they show that the masters are open to a serious combination from the men; but it may be found, on the other hand, that the men have fair ground of complaint against the masters. The result, however, is the same to the public interests; for either we are forced to give higher prices, or the service must suffer by delay.

To remedy this state of things, so far as setting up is concerned, it appears to me that the only way will be to call a meeting, under the Honourable Board's sanction, of the gun contractors who are employed by this department; one or two persons being deputed from the Birmingham contractors, and the same number from the London, to meet at the Tower, where I would attend, with the assistance of Mr. Gunner, storekeeper and superintendent at Enfield, and with any other person on the part of the Ordnance, if the Honourable Board may deem it proper. That every process in detail should be gone carefully through, item by item, and the prices that are to be paid to the workmen fixed and settled; taking the scale of prices paid in the Royal manufactory as a guide, but subject to such modifications as the differing circumstances of the private trade may point out as necessary; and when this has been done, that then the per-centage shall be determined upon, which the contractor shall receive for his outlay of capital, his risk, losses, time and trouble.

I would further advise, that the workmen's prices, when so fixed, for Ordnance work, should be printed and distributed, and that no contractor should be allowed to give more or less than such scale allows; and if this be done for the principal kinds of percussion arms of which the patterns are now finally determined upon,—viz., the muskets of each kind, the carbine, the rifle, and the pistol,—it does appear to me that the present disorganised condition of the workmen may be corrected, and that a base will be laid for obtaining arms for the public service with more regularity and at a more fair and reasonable price in future.

I have mentioned this proposal to some of the leading contractors at Birmingham and in London, who are quite ready and willing to enter into such an arrangement; and I would, therefore,

therefore, beg to call the Master-General's and Board's closest attention to its probable effects in all its bearings; and if, after due consideration, they shall be pleased to approve of it, I would very respectfully request that the requisite authority may be given for carrying the proposition into effect.

I have, &c.,
(signed) *Geo. Lovell,*
Inspector of Small Arms.

(A true copy.)
(signed) J. Wood, Secretary.

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23 September 1840.

Read, and (with reference to the accompanying memoranda of the Master-General and clerk of the Ordnance, upon the questions involved in this Report,) inform Mr. Lovell that the Master-General and Board cannot of themselves interfere in any proceeding affecting the arrangements of the contractors with their workmen; and, therefore, while they fully appreciate the motives and the anxiety for the public service which have prompted the suggestion on his part, they decline giving their sanction to the proposition as it stands, though they can have no objection to his mediating individually, and in his private capacity, with the trade, in aid of the objects he has in view, and which might lead to advantageous results both to the service and to the parties with whom he may communicate.

Express to Mr. Lovell the satisfaction of the Master-General and Board with the ample information furnished in the return he has transmitted, and by the exertions which that return shows to have been made in forwarding the preparation of percussion arms; which exertions they wish may be pressed as much as possible, in respect to the "altered to percussion muskets," and the "muskets for serjeants."

(A true copy.)
(signed) J. Wood, Secretary.

(B.)

(S—1362.)

Copy of Letter from the Inspector of Small Arms upon the organised Combinations of Gun-makers at Birmingham and in London.

Sir, Small Arms Office, Tower, 26 January 1842.

With reference to my two Reports, of even date herewith, upon certain memorials from persons calling themselves "the body of gun-makers" employed in setting up arms for the Ordnance at Birmingham and in London, I have long perceived the evil of such an institution; and therefore, before an answer is returned to those persons, I would take the liberty to put the question distinctly to the Master-General's and Board's consideration, whether it is expedient to recognise such a body officially.

Whatever may be stated to have been the original cause of this union, there is no doubt that its effect is to enhance the price of military weapons to the public, and that it is in fact a combination for that object as against the Ordnance for reducing the wages of labour as against the workmen, who, however, have their own unions as a counterbalance.

The system is now more completely organised than ever; the body of gun-makers at Birmingham appoint a regular secretary and speaker, as do also the body of gun-makers in London; when any description of arm is to be set up for the public service, and I call upon any one or more of the contractors for their prices, they immediately refer the question to their own body, and the two bodies meet or correspond, according to circumstances, before any answer can be given. They determine the prices that shall be given to the workmen, and the price that shall be paid for the arms by the Ordnance, and no one can undertake to work at an under-price so long as he belongs to that body. The bond of union is now more complete than ever, because greater facility of communication enables the two bodies to act more immediately in concert. I am aware that former Boards have accepted similar communications to the present, and have given audience to deputations from the body of contractors. I found this to be the practice when I first came into the duties of my present office; but I have constantly repudiated the combination to the contractors themselves in all my communications with them, and I have never ceased to call the Honourable Board's attention to the inconvenience of it for many years before.

I now feel this inconvenience more than ever, not out of the facility or apparent weight that the system seems to give to complaints such as the Board have just received (for these must necessarily be expected in every service where strict and honest revision is called for), but because I am certain that the public service suffers severely from such a perfect organisation, as has entirely excluded the principle of competition from the supply of an article so important as the arms of the whole service.

I am not prepared to suggest an immediate remedy for this evil; I believe it can only be effected by gradual and indirect means; but before the Master-General and Board

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recognise this combination, I consider it my duty to submit the above points for their serious consideration, and unless there should be urgent reasons to the contrary, which I am not aware of, I would very respectfully suggest, that whatever their decision may be upon the subject-matter of complaint brought before them in the present instance, their answer should be addressed to one person only, with an intimation that the Master-General and Board will be always open to the complaints or communications of the contractors in their employment, but that they do not deem it consistent to communicate with them as a body.

I have, &c.
(signed) *Geo. Lovell*,
Inspector of Small Arms.

R. Bayham, Esq.,
&c. &c. &c.

(A true copy.)
(signed) J. Wood, Secretary.

(C.)

(S.—1737.)

COPY of LETTER from the Inspector of Small Arms, respecting the Disadvantages of the System pursued for obtaining Arms.

Sir, Small Arms Office, Tower, 16 December 1848.

I HAVE to acknowledge the receipt of the Honourable Board's order, dated 29th ultimo, $\frac{0}{285}$, referring to a statement of mine, that a saving might be made in the purchase of small arms, if another than the present system were adopted, and desiring that a plan be submitted towards arriving at that desirable end.

The statement which I took the liberty to make verbally to the Honourable Clerk of the Ordnance and the Honourable Principal Storekeeper, was, in substance, that the practice of permitting the situations of tradesmen to become objects of political struggle, operates against the inspector of small arms in his efforts to keep down prices; that what is called "The Board's List of Tradesmen" is an institution that enhances the cost of small arms to the public; and that, if the trade were to be thrown open, a saving might be effected in price. This is no new opinion of mine; I perceived the evil tendency of such a system directly that I joined my present office in 1840; and by reference to my letters, dated 31st August (S—1554), and 10th September 1840 (S—1574), 10th March 1841 (S—1314), to three reports, all bearing date 26th January 1842 (S—1287), D 9, and to that of 24th December 1845 (S—1642), the Honourable Board will be able to form some notion of the disorganised state of the Small Arms department when I took it in hand, and of the difficulties I have had to contend with in bringing it to its present efficient state. A perusal of these papers will also lead to a better understanding of what is to follow.

The peculiar circumstances that affect the manufacture of military arms by private hands are these:

1st. It is nowhere carried on but at Birmingham and in London; consequently there is never that full competition which is found in other articles that are fabricated in various localities.

2d. The demands upon the trade by the Government have ever been excessively irregular, always sudden, and sometimes to enormous amounts, as during the late war; and then again, as suddenly ceasing altogether for 20 years running, as was the case from the time the war ceased until the percussion plan was adopted.

3d. The selection of only certain masters had the effect of causing a struggle amongst these masters themselves, and with the non-elected of the trade; each man to get as many of the labourers to himself as possible, with a view to secure the largest share of the Government orders. This caused the operatives (who have always been in the habit of working for several masters at the same time, and are not often attached to any one in particular) to take advantage of this desire, and establish their clubs, their unions, and their lists for enhancing the rates of wages against the selected masters, and consequently against the Ordnance.

The obvious remedy for such a state of things would be, first, to determine the numbers of arms that are to be manufactured; so equalising and regulating the calls to be made upon the trade as to spread them over the widest possible period, and then to throw the trade open entirely.

Tenders should be called for by public advertisement, with the explanation that from amongst those who offer to do the work at the lowest price, and can produce security for a regular monthly delivery to the amount required, a certain number of masters will be selected to execute the work for a period to be fixed, and that such selection will be governed solely by reference to the lowest price offered, and by consideration of the capabilities of the parties to fulfil their contracts.

I must premise that it would be essential to the full success of this course,—

1st. That the contracts should extend over a period of not less than three years at a time.

2d. That

2d. That the numbers of contractors to be advertised for should be no larger than may be sufficient to ensure the supply of the numbers of arms required by the Government (for the plain reason, that the larger number each person has to provide, the smaller he will be able to fix his rate of profit).

3d. That the tariff of wages to be paid to the workmen should be defined and fixed.

With regard to the latter proviso, I would refer to my letter, dated 10th September 1840, and state, that although the Master-General and Board, by their order of 23d September 1840, (S—1574), declined to interfere of themselves in the proposition then submitted to them, I felt so impressed with the advantages that would arise out of it that I was induced to persevere; and I have, since the year 1842, been enabled to bring about an understanding between the masters and workmen, and to establish a "List of Prices of Labour," by which every master has agreed to be governed; which the workmen themselves find to operate beneficially, and which has had the effect of doing away "strikes" for wages ever since.

I would not, therefore, disturb this arrangement, or touch the wages of labour at present at all; for I believe that, with few exceptions, the prices paid for labour in the gun trade are generally fair and reasonable; it is only the masters' profits that require to be brought into competition.

I will first take the "setting-up branch," because it is in this where the largest saving may be looked for; and the cost of the new line percussion musket will be a convenient example.

	£.	s.	d.
The cost to the master in labour (and this, as before stated, is a fixed price) is - - - - - - - - - -	-	18	10
He demands for interest on capital, for time, trouble, and contingencies - - - - - - - - - - -	-	7	5
The setting-up price being - - - £.	1	6	3

Thus the master, upon an outlay for labour of 18 *s.* 10 *d.*, derives an advance of 7 *s.* 5 *d.*, or 24 ½ per cent., to cover the interest on his capital, and to pay for his time, and trouble, and for accidents; and as he invariably receives his money every month, he is enabled to turn his capital 12 times in the year; and that without any risk of the bankruptcies or delays that mere private commerce brings with it.

I have looked into the article "Contingencies," and I find that in the Royal manufactory at Enfield, including fuel, tools, oil, &c. &c., it amounts to 11½ *d.* on each musket, and from the best estimate I can gather from practical men, the item does not stand at more than 8½ *d.* to the private master.

Now, I must remain of opinion that if the trade were to be thrown fairly open to free competition, there are many masters to be found who would be willing to work their capital, time, and trouble at a very much lower premium than the above.

With regard to the supply of barrels, there would be more difficulty, because larger capitals in workshops and machinery are required, because the supply of iron fit for the purpose is in the hands of very few persons, and because this department has not the means of checking the prices of the masters; the works for barrel rolling, which were ordered some years since to be erected at Enfield, never having been carried into execution.

The cost at Enfield for labour and materials, in boring, turning, and finishing the new line musket barrel from the black, is 4 *s.* 6 *d.*, which deducted from 12 *s.* (the contract price that is paid to the trade for the finished barrel) would leave 7 *s.* 6 *d.* Then if we allow from this the sum of 2 *s.* 9 *d.*, which I estimate the cost of the barrel to be in the black state, viz. (11 lbs. of iron, at 3 *d.*), there remains the sum of 4 *s.* 9 *d.* to the master for interest on his capital, for time, trouble, and contingencies. All this would show, I think, that here also it may be reasonably expected a reduction would be brought about by the action of free competition.

With respect to the locks, it may be a question, whether the agency of masters might not be dispensed with altogether.

	£.	s.	d.
The price paid by him to the filer is - - - - -	-	5	-
He pays for forging (including materials) - - - -	-	-	9
And he demands for capital, &c. - - - - - -	-	1	3
The contract price of the lock being - - - £.	-	7	-

So that on this article also it is pretty clear that a reduction of price would be attained by opening the trade, or receiving the locks direct from the filers.

The supply of bayonets is already going forward somewhat upon the principles of the plan herein propounded, and though circumstances at the time of making the agreements would not admit of competition as to price, there is not any reason to doubt but that such principle may be acted upon with similar effects as to reduction in price when the present contracts expire.

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As regards the smaller articles, such as rammers, triggers, nipples, screws, nails, &c., the same system of competition should be generally carried out for the sake of uniformity; but in these I do not think that any very significant reduction in price can be expected; because I have all along endeavoured to deal direct with the working men themselves which the system of monthly payments has enabled me to do; and by this means, all masters' and factors' profits being done away, we pay only the fair price of labour and materials.

In treating this subject, I have sedulously avoided all idea of lowering the quality of the musket either in workmanship or material; for in that I am convinced there would be no true economy; the standard that has been arrived at should be rigidly maintained.

Again, it will be seen that I have confined myself closely to the bare question of the cheapest course through which small arms can be purchased.

In proceeding to carry such a plan into effect, it would remain to be considered whether the wants of the service will admit of the calls for arms being arranged and regulated in the way pointed out; whether the present state of the store of small arms is large enough to bear the risk of any check in the regular supply which such an entire change of system might for a short time bring about. Then it would be only just to give full previous notice to the present tradesmen of the intention to carry such change into effect, if it should be resolved upon, more especially to the barrel masters, who are obliged to provide stocks of iron of peculiar and expensive quality to meet the requirements of this office; and such lengthened notice would also enable many masters not now employed to make arrangements for entering into the competition that is wanted.

These are matters specially for the Honourable Board's consideration. All that seems necessary for me to state further is, that by the perfect success of the desiccating process for seasoning stocks, which is now in full operation at Enfield, and by the powerful assistance of the machinery for jointing and percussioning, which I have introduced of late years, and looking to the store on hand, I can be certain of providing in regular succession a sufficient supply of stocks, locks, bayonets, and all other materials, to whatever extent and for whatever period may be determined upon.

I have, &c.
(signed) *Geo. Lovell,*
Inspector of Small Arms.

R. Byham, Esq.,
&c. &c. &c.

(A true copy.)
(signed) J. Wood, Secretary.

(D.)

(S—1540.)

Extract from a Letter of the Inspector of Small Arms, on the subject of the Periods of Time when the setting-up of Muskets should properly commence; dated 17 July 1850.

"In obedience to the Honourable Board's Order, dated 15th instant (S—1537), respecting the periods and proportions of delivery to be fixed with the contractors for setting up sea service and extra service muskets, I beg to report that each of the contractors has received a portion of materials from store, which are in hand ready to commence upon. Therefore, it will entirely rest with the Honourable Board how much further time they would feel inclined to afford to the contractors, with the view that they may come to some understanding with the working men who are at present holding out for wages.

"If the contractors are called upon to make their first delivery of rough-stocked guns in the first week in August, commencing the 5th of that month, the first delivery of finished guns cannot be calculated upon before the 14th of September next; after which there will be only 26 weeks of continually decreasing daylight, up to the 10th March 1851, in which 40,000 muskets, or 1,540 per week, are to be finished in Birmingham, and 20,000, or 770 per week, in London.

"From my knowledge of the trade at large, I do not think (even if all differences about wages were set at rest) that there are a sufficient number of military gun-makers in Birmingham to keep up a regular delivery of muskets to that amount; and if we take into account the numbers of men from that class of artificers who will be employed by the masters that have been disappointed in their efforts to obtain contracts, and bear no good will towards the four who have succeeded, I do not think, in the short time that is now left, there is any chance of these four fulfilling their contracts to the extent at first named."

"G. Butler, Esq.,
&c. &c. &c."

(True extracts.)
(signed) *J. Wood,* Secretary.

(E.)

(S—1504.)

Extract of a Letter from the Inspector of Small Arms, reporting the Reductions that may be made in the Small Arms Department at the Tower and Birmingham; dated 12 June 1850.

"I have delayed reporting upon the question referred to me in the Honourable Board's communications of 20th and 29th ultimo (O—132, and S—1482), in the hope that the workmen of the trade in London and in the country (who have struck for wages) would have gone to work; so that I might calculate with some degree of certainty as to the number of weeks in which the arms contracted for by the Honourable Board will have to be completed; for on this question must mainly depend the estimate of the numbers of viewers that it will be necessary to retain.

"As I do not learn, however, that as yet there is any probability of the men returning to their employments, I can only place the base of my calculation upon an assumed point."

"G. Butler, Esq.
&c. &c. &c."

(True extract.)

(signed) *J. Wood*, Secretary.

(F.)

Printed Notices.

(S—1217/51.)

A general Meeting of the members belonging to the London Operative Gun-makers' Society will take place at Mr. Meldau's, the White Hart, Leman-street, Whitechapel, on Tuesday, December 31st, 1850, to receive the report of the committee, as requested by the members at the last general meeting to be prepared, upon the necessity of ascertaining, if possible, the determination of the workmen employed in the various branches of the gun trade in Birmingham, relative to the present system of tendering for the setting up of small arms; such information to be gained by deputing certain members of the London society to proceed to Birmingham for that purpose.

The committee, therefore, earnestly request the members to meet sufficiently numerous upon this important occasion, that it may be considered a large majority of the gun trade in London gave their approval or disapproval of such measures as in the report may be suggested.

Chair taken at eight o'clock precisely.

(S—1217/51.)

To the Tower Gun Trade in General.

A general Meeting will be held at the Fox and Dogs, Princip-street, Birmingham, on Thursday, 9 January 1851, to meet a deputation from London on business of great importance.

Chair to be taken at seven o'clock in the evening.

Extracts from the "Birmingham Journal," 13 March 1852.

Since our last publication we have been waited upon by a deputation of gun manufacturers, in reference to the dispute at present unhappily existing between themselves and their workmen. The representations of these gentlemen are so much at variance with the statements made by the workmen, that we find it extremely difficult to arrive at any satisfactory conclusion relative to the real state of the case as between the parties, and can only hope that the following well-timed and appropriate letter from W. Scholefield, Esq., M.P., may have the desired effect:

To the Editor of "Aris's Gazette."

Sir, Birmingham, 11 March 1852.

All who are interested in the welfare of our town will have witnessed with deep concern the differences at present existing between the masters and men connected with the gun trade,—differences arising out of the Government contracts for the new military rifles. Upon the merits of the case I do not offer one word, for I have no information which warrants a decision one way or the other. It is impossible, however, not to see that the dispute involves the most serious consequences, not only as adding another to the already too numerous list of differences between employers and employed, but especially as regards the

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interests of the particular trade in question. Already it is understood that the Government has largely extended the operations at Enfield, and, no longer confining itself to repairs and experiments, has undertaken many processes of manufacture; and it is seriously to be feared that the Ordnance Office will not be slow to avail itself of any excuse for still further steps in this direction. On every account, then, it is earnestly to be desired that a speedy arrangement should be effected; and I would respectfully suggest that means be taken for submitting all differences between the master gun-makers and their men to arbitration. I am sure there would be no difficulty in finding gentlemen whose high honour and general character would be a guarantee to all parties at once for an intelligent and honest decision; and I cannot but think that if entered upon in a spirit of mutual kindness and forbearance, a satisfactory termination might be put to this painful and threatening dispute. I need scarcely say that I have no further interest in this matter than that of an earnest desire to see conciliation and compromise take the place of hostility and distrust; and

I am, &c.
(signed) *William Scholefield.*

In consequence of the above letter, the operatives held a meeting on Saturday last, at the Fox and Dogs, Princip-street, and resolved upon waiting on the whole of the masters to whom they had submitted lists of the prices they intended to charge for making the new rifle gun. In compliance with that resolution, a deputation of the body waited upon 12 of the principal firms, all of whom signed the following document: "We, the undersigned gun-makers of Birmingham, who received forms of tenders for the contract of a new rifle musket, acknowledge that we received a printed circular containing the prices fixed by the working men, and that we tendered accordingly, considering that the prices demanded were fair and equitable." To-day another meeting of the men will be held for the purpose of considering the propriety of submitting the case to arbitration; but it is understood that the men will not consent to arbitrators who have not a practical knowledge of the business.

The Gun Trade.

13 March 1852.

We are unfortunately again compelled to refer to this dispute, in consequence of the statements made by the workmen, and published by us last week, being impugned by the other parties in the controversy, viz., the contractors; and we are induced to return to it, not only to give the other side a fair hearing, but from an earnest desire to suggest a course by which these differences may be adjusted, before they lead to consequences calamitous to all concerned, and injurious to the town itself. To state the matter shortly, the great point in dispute is, whether or not the estimates on which the contracts were obtained were on the advanced prices. The workmen say they were; that the prices contained in their circular of the 16th of January were the basis of the calculations made by the contractors: that the price contracted for consequently embraced the advance; that the men pledged themselves not to work for lower terms; and that the refusal of the masters to give the prices upon which they tendered is a breach of faith. Now the answer of the contractors is simply this, and amounts to a total denial of the facts upon which the refusal to accept the lower prices are based.

A few days before the tenders for the new rifle muskets were returned to the Board of Ordnance, the workmen sent in a list of prices at an advance upon the list of 1849, 1851, and the 10th of January 1852. A few days after receiving this advanced list, and previously to settling the price with the Board of Ordnance, the chairman of the Operative Gun-makers' Society was sent for and asked, supposing that arrangements could be made for giving out to the workmen the new rifle musket in such a manner as that they would have no more trouble with them than with the new line musket, would they undertake the work at the prices named in their list of 1851; that is, the low prices? The chairman said, that the workmen would undertake to work at these prices on the conditions named. After this interview, and not before, the prices at which the contract would be taken were settled with the Board of Ordnance.

The contractors, moreover, contend that the reason assigned for the increase of price, viz., that the rifling of the barrel and the complicated new sight increase the labour and liabilities of the workmen, as compared with the new line gun, is not true; inasmuch as the stockers, who are the principal parties in the dispute, have nothing whatever to do with the rifling of the barrel or the sight, their labour being precisely the same as in the new line musket. This statement applies equally to the finishers, the other parties in the dispute. The rifling is no part of their duty, and the "sight" being new and complicated, the contractors did not intend to place this in the hands of the finishers; but to do it as at Enfield, where competent workmen are appointed exclusively to that duty. These are the two principal questions at issue between the workmen and the contractors; and now comes a serious consideration.

Last week we referred to the Government works at Enfield, which, from being a mere repairing establishment, are fast becoming a great manufacturing depôt, which promises speedily to absorb the whole of the Ordnance orders. Already vast quantities of locks and

and barrels are made there, and as the prices paid to workmen are lower, it is not improbable that the whole of the Government demand will be supplied from that source. These unfortunate disputes will hasten this catastrophe.

(G.)

(G—648.)

Copy of a Representation from Unsuccessful Competitors for Contract for setting up Small Arms.

Right Honourable and Honourable Gentlemen, Birmingham, 9 July 1850.

In conformity with the wish of Sir Thomas Hastings, expressed to Mr. Tipping, we, the late setters up of small arms, beg to lay before your Honourable Board the following statement of facts. We lately received forms of tender for setting up guns, and before replying to them, we consulted the men as to their willingness to make a reduction in their wages. After due consideration on their part, they informed us that they were unwilling to make any reduction, but that, on the other hand, they would pledge themselves not to ask for any advance during the progress of the contract. After fully considering the wages asked, and taking into consideration the fact that the price of one of the guns had lately been considerably reduced, we came to the conclusion that no reduction of wages ought to be asked for. It appears that four of the setters up were of opinion that the wages might be reduced, and consequently made their calculation of the cost at a lower rate than we did. This will explain the reason why our tenders were higher than those of the four gentlemen we allude to. The orders were accordingly given to those four; and they, having no chance of making a reasonable profit but by getting it out of the wages of the men, gave notice of their intended reduction. The men refused to submit to the reduction, and still refuse to do so; and the consequence is, that nothing has been done during the five weeks that have elapsed since the first issue of materials. Our opinion is, that the men are not likely to give way, and we know that many of them are turning their hands to other branches of the trade. The quantity of guns to be set up here is so considerable, that the four contractors can only do them by employing the whole of the experienced hands, and by taking from us the men we have hitherto employed on the guns for the Honourable Board. We are informed that the four contractors intend to apply to your Honourable Board for a remission of the fines they have agreed to pay of 2*s.* 6*d.* on each gun "found short in the weekly number;" and we beg to suggest that if this request, or that for an extension of time, be granted, it is equivalent to an advance of price. And we beg to ask whether, in this case, the same indulgence will be granted to us on future and similar occasions.

We have, &c.

(signed) *Sarjent, Brothers.* *Thos. Moxham.*
B. Woodward & Son. *Tipping & Landon.*
W. J. King. *W. & E. Hollis.*
Walter Adams. *Richard Cutler & Sons.*
T. H. Philips. *William Powell.*

The Principal Officers of
Her Majesty's Board of Ordnance.

(True copy.)
(signed) J. Wood, Secretary.

(H.)

Copy of Letter from Inspector of Small Arms, showing the Progress made by Barrel Makers at Birmingham.

Small Arms Office, Tower, 18 March 1852.

Mr. Lovell presents his compliments to Mr. Butler, and begs to enclose a statement, in detail, showing the progress made by each of the master barrel makers at Birmingham, up to 13th instant, in the contracts entered into under the Honourable Board's order of 6th June 1851 (S—1361), for the supply, in the aggregate, of 23,000 barrels for rifle muskets, in the filed state.

The 5,000 barrels in the rough-rolled state, included under the same order, have been all supplied in due course.

As an illustration of the entire monopoly which has always existed in this branch of manufacture, Mr. L. begs to enclose the copy of an order that he received from the Honourable Board, on 20th February 1839, when all the barrel makers joined in demanding one and the same price, and that price 21*s.*, when the real value was not over 12*s.*

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Since that period, from the same combination, the department has at several times been forced into paying for barrels in the rough-rolled state and lumped, to be bored, &c. at Enfield,—

		lbs.	*oz.*		
Musket - -	weight	8	10	-	5 *s.* each, or 64 *l.* 0 *s.* per ton.
Rifle - - -	„	6	10	-	5 *s.* „ or 84 *l.* 10 *s.* „
Carbine - -	„	5	11	-	4 *s.* „ or 78 *l.* 16 *s.* „

When the iron of which they were made did not exceed the price of 20 *l.* per ton.

And under the order above quoted of 6th June 1851, for rough-rolled musket barrels not lumped, at the rate of 42 *l.* per ton, when the iron cost no more than 18 *l.* per ton, and this solely because the Ordnance Department had not the means and machinery for making the barrels in the Royal manufactory, where there is an abundant power of water unemployed.

It will be seen by reference to the last series of tenders offered, that they are all at the same price, which shows that there still exists the same combination amongst the barrel masters at Birmingham; and it must be always borne in mind that military barrels are not made at any other place in the United Kingdom.

G. Butler, Esq.,
&c. &c. &c.

(True copy.)

(signed) *J. Wood*, Secretary.

(I.)

(G—758.)

Copy of Memorial from the Military Gun-Lock Makers, relative to their Inability to execute Orders.

To the Honourable the Board of Ordnance.

26 June 1852.

We, the undersigned, being military gun-lock makers, who have received tenders for the supply of 800 pistol locks, beg most humbly and respectfully to lay the following address before you, with the view of showing the position in which this branch of trade is placed, and our inability to execute the orders of your Board in the satisfactory manner in which we have heretofore executed them.

After the percussion lock was introduced into the service, the nice character of workmanship was such, that only a very limited number of hands in the trade were sufficiently skilled to execute it; and 100 locks per week were, we believe, for a long time, the maximum amount of possible supply.

Further niceness and exactitude of workmanship were from time to time required, and these requirements were gradually met by the exertions of the masters; for orders being received with almost periodical regularity, and being distributed amongst the masters in proportions which had reference to their facilities of supply, and an adequate remuneration being given, the masters cultivated and felt a secure dependency upon this branch of the trade, and by great outlay in tools and implements, and by improved modes of their construction, and by raising the skill of second-rate workmen, and training boys, a quality of work and a numerous and efficient body of workmen were at length obtained, which we venture to assert may bear comparison with those of any other country; and our facilities of supply had so increased, that upwards of 1,000 locks per week were, a short time before the system of tender was introduced, supplied to your Board. These facilities are no longer within our power.

Under the system of tender, the dependency and security of the masters as a body are lessened; for only two or three of them can individually have the orders, or benefit by them; and a spirit of competition which seemed necessary for their individual welfare was provoked; but while a saving was thus effected in the Small Arms department, we ourselves met with but a poor and inadequate return for skill and capital, and our workmen became one of the worst-paid class of artisans in the kingdom, until at length, as in the recent order for 10,000 locks, the masters were absolute losers, and the skilled gun-lock filers employed thereon were often suffering much privation and distress.

Consequences to be deplored have resulted from this state of things, for the men have from time to time embraced more remunerative employment, as for instance, great numbers are employed upon revolving pistols, and at this present juncture we could not rely upon more than 20, or at most 30, efficient workmen to execute your order; and we are sorry to say that the difficulties that surround us absolutely deter us from undertaking to supply a specified quantity, and it would be impossible to supply the quantity required.

We, however, would assure your Honourable Board that our best exertions shall be used, should you deem it prudent to allow due latitude to enable us to meet the risk and contingencies to which we must be subjected; and we trust, under the circumstances, you will afford

afford us a price liberally remunerative for our skill and capital, as you would by such means, in all probability, save from annihilation the important branch of trade in which we have embarked.

(signed) *Joseph Brazier & Co.*, Wolverhampton.
Wm. Partridge & Sons, Darlaston.
Wm. Corbett, Darlaston.
James Francis, Birmingham.
Samuel Sansom, Wednesbury.
Richd. Ashmore & Son, Wednesbury.
Thomas Turner, Wednesbury.
John Duce, Wednesbury.

(True copy.)
(signed) J. Wood, Secretary.

(K.)

(E—2561.)

Copy of Letter from the Storekeeper at Enfield, reporting the Failure of Mr. *John Duce*, Contractor, to supply Pistol Locks.

Sir, Office of Ordnance, Enfield, 28 September 1852.

I feel it my duty to report to the Honourable Board that John Duce, of No. 2, Lambeth-street, who had contracted to supply 800 pistol locks, for service of the Royal manufactory, under the Board's order of 21st July 1852 (C—2638), has failed to fulfil the conditions of his contract; viz.—

"The contractor to deliver the locks at the rate of 200 per week, the first delivery to commence in six weeks."

Up to the present date, he has only delivered 217 locks, of which 106 have been rejected for inferior workmanship; so that 111 only have been received and approved as fit for service.

As much delay and inconvenience have been occasioned in setting up the arms, by the non-fulfilment of the terms of the contract by Mr. Duce, I would respectfully suggest for the Honourable Board's consideration, that he be called upon to complete, in one month, 400 only of the 800 locks contained in the order, and that the remainder be provided in the Royal manufactory at this place.

I have, &c.

Geo. Butler, Esq., &c. &c. &c.

(signed) *R. W. Gunner*, Storekeeper.

(True copy.)
(signed) J. Wood, Secretary.

Ordered to be communicated to Mr. Duce, and desire him to state the number of locks he will, without fail, deliver weekly.

F. P. D.
T. H

(True copy.)
(signed) J. Wood, Secretary.

(L.)

(S—2532.)

Copy of Letter from the Inspector of Small Arms, reporting the Failure of Messrs. *R.* & *W. Aston*, Contractors, to supply Sights for Muskets.

Sir, Small Arm Office, Birmingham, 13 January 1853.

I beg to report that Messrs. R. & W. Aston have failed to complete their order for 6,000 sights for muskets, dated 11th October 1852 (O—2746), only 672 having been delivered by them up to the 31st December last, the period limited by the order for the whole to be supplied.

I would recommend that they be called upon to supply not less than 600 per week, unti the whole are finished, under the usual fine of 6 *d.* each for non-performance.

I have, &c.

Geo. Butler, Esq. &c. &c. &c.

(signed) *Geo. Lovell*, Inspector of Small Arms.

(True copy.)
(signed) J. Wood, Secretary.

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14 January 1853.

Ordered, That Messrs. Aston be acquainted that great inconvenience arises to the service from their delay in executing this order; and that they be desired to proceed with the same as expeditiously as possible, and to deliver not less than 600 per week, under a penalty of 6 *d.* per sight per week, for such as they shall fail in delivering to complete 600 per week.

F. P. D.
W. F. B.

(True copy.)
(signed) J. Wood, Secretary.

(M.)

(A—2851.)

Copy of Letter from Messrs. *R. & W. Aston*, relative to the Cause of Delay in supplying Back Sights for Muskets.

Sir, Birmingham, 18 January 1853.

In reply to your note of the 14th, we beg to say we are very sorry to have caused you to remind us of the non-completion of the order for back sights; but after having completed the former order our men made a general strike; they having an idea we had but a limited period to execute the order, and other branches of the trade being busy, many of them procured other situations, and we have had fresh hands to learn; but we are now doing about the number required, and have no doubt shall be able to proceed without any further inconvenience to the service. Trusting the Honourable Board will consider the above explanation satisfactory (without having recourse to fines), as their assistance in these matters will be the only means of preventing such occurrences,

We are, &c.
(signed) *R. & W. Aston.*

G. Butler, Esq.,
&c. &c. &c.

(True copy.)
(signed) J. Wood, Secretary.

(N.)

Extracts from Letters of the Contractors for Materials for 20,000 Rifle Muskets, Pattern of 1853, stating Causes for the Delay in completing the same.

Locks.

Messrs. *Joseph Brazier & Sons*; dated 16 January 1854.

"The delay of sending our supply is caused by the unwillingness of the men, refusing to make the locks at the price we understood was to be paid."

Rods.

Messrs. *T. & C. Gilbert*; 16 January 1854.

"We have been disappointed by two of our oldest rod hands, who promised to come to work, but have not."

Bayonets.

Messrs. *Heighington & Lawrence*; 16 January 1854.

"Our blade forger, the only one we have who can forge bayonet blades, has had a severe illness for three weeks."

Barrels.

Mr. *H. Clive*; 17 January 1854.

"My non-fulfilment of your contract for last month arose from two causes; my no being able to make arrangements with my men so soon as I had anticipated, and by the frost and want of coal."

Mr.

Mr. *John Clive*; 17 January 1854.

"Delay—continued strike of workmen."

Mr. *Ezra Millwood*; 16 January 1854.

"The deficiency of the barrels agreed to be delivered by me has been occasioned by my men, the grinders and filers, turning out for price."

Bayonets.

Messrs. *G. & E. Rowe*; 16 January 1854.

"We have been behind with the supply, but have had a great difficulty in procuring workmen."

Barrels.

Messrs. *Turner & Sons*; 16 January 1854.

"We beg most respectfully to state, the reason we have not done our quantity of rifle musket barrels is, we have had a breakage with our mill."

Messrs. *Beasleys & Farmer*; 17 January 1854.

"The delay has been caused by a strike of our workmen."

Locks.

Messrs. *Joseph Brazier & Sons*; 18 January 1854.

"In the first place, there was a strike with the men refusing to file them" (the locks).

Mr. *John Duce*; 26 January 1854.

"The viewer has been very vexatious in the viewing, which has caused much needless delay."

Signed by *Benjamin Turner*, in behalf of the Trade; received 3 February 1854.

"But since then some of them think their price too much, have called a meeting of the masters, and met at the Turk's Head, Wednesbury, where they combined together, and, as we are informed, given or signed a bond to each other to give no more than 6 *s.* per lock, and go as far as to say, they are having the work in faster than they want, which has induced us to stand, though much against our will; therefore we humbly beg your consideration on our case, and adopt such plan as will put down this oppression that is bearing upon us, and will cause us to take to other sort of work, which will injure your supplies, if they are wanted. The trade is in great confusion, and we must look for other sort, which will keep us on regular, for the support of our families."

Bayonets.

Messrs. *John Roe & Son*, and *G. W. & E. Roe*; 3 February 1854.

"We have therefore great difficulty in getting men to finish and fit them properly.
"If you could allow us a little ease in the inspection, we should be very thankful."

(True extracts.)

(signed) *J. Wood*, Secretary.

Locks.

(P—1546.)

Sir, Darlaston, 19 January 1854.

In answer to your letter of the 14th instant, respecting the deficiency of our supply in locks, we beg to say, that we have been making extra tools and patterns, so as to put additional hands upon them, and that now we hope to supply the locks according to agreement.

We are, &c.

G. Butler, Esq. (signed) *J. & E. Partridge.*

Appendix, No. 1.

(C—5065.)

Gentlemen, Darlaston, Pinfold-street, 21 January 1854.

Having received a letter, dated 14th instant, respecting have not supplied with the number required for the last month; having been a alteration of the pattern lock, it has delayed us, which I hope and trust that I shall be able to make up the deficient in this month.

I remain, &c.

The Honourable Board of Ordnance. (signed) *William Corbett.*

(S—4345.)

Sirs, Darlaston, 17 January 1854.

Your letter of the 14th instant has come to hand. I expected that the 76 locks of the first pattern, which was passed the last month, would have been counted to the 53 of the last pattern, which would have made them 129; if they are not to be counted to the last pattern, I could make them up during the next two months.

I am, &c.

The Honourable the Board of Ordnance. (signed) *Samuel Sanders.*

(F—127.)

28, Edmund-street, Birmingham,

Sir, 18 January 1854.

In answer to yours of the 14th instant, respecting the supplies of locks and rammers, on the Honourable Board's order, dated 6 October 1853, I beg to say, that owing to the alteration of the patterns, it has taken me a much longer time than I expected; but I am now sending in more, and shall have a surplus at the end of this month, I hope, to make up all that is deficient.

I am, &c.

G. Butler, Esq. (signed) *James Francis.*

(A—3731.)

Sir, 26, Edmund St., Birmingham, 19 January 1854.

In reply to yours, dated 14th instant, respecting a deficiency in our supplies of the following articles, on the Honourable Board's Order, dated 5th October 1853, we beg to say, that with respect to the front and back bands, rammers and locks, the principal cause of delay was the Christmas holidays, and it being the commencement of the order we were unable to prepare for it, but are now sending in our full numbers, and have no doubt we shall be able to make up all arrears within this month. With respect to the bayonets, we think it may take us rather longer, but not more than six weeks. Hoping this will be satisfactory,

We are, &c.,

G. Butler, Esq. (signed) *R. & W. Aston.*

(D—2019.)

Gentlemen, Wednesbury, 26 January 1854.

I beg to reply to your letter of the 14th instant, and to state my reasons for not having sent in the new pattern locks according to my agreement.

In commencing to make them, I find it has taken me longer to prepare the tools for the men than I at first calculated, but they are now complete.

I must also add, the viewer has been very vexatious in the viewing, which has caused much needless delay, or I should not have failed in a regular delivery of my portion of locks.

I hope to bring up all arrears in the next month.

I am, &c.

The Honourable Board of Ordnance. (signed) *John Duce.*

(D—2040.)

Gentlemen, Wednesbury, 15 February 1854.

I find the viewing of the gun locks at Birmingham to be so severe that it is impossible to proceed with the work satisfactorily. I have locks there that have been rejected for faults so trifling that I feel confident your Honourable Board will not tolerate. I have been there several times to see Mr. Lovell respecting them, but could not find him. I was there yesterday, and find I have locks again returned, through some imperfection in the machinery for grinding out the plate for the limp of the barrel, which, of course, is nothing at all to do with the lock-maker. I am also aware that the same men's locks have been passed for other lock-makers for precisely the same faults that are rejected for me. It has greatly impeded the progress I should have made in your Honourable Board's work, as I can safely assert I should at the present time been able to have done a treble quantity of work

work to what I have undertaken to do had the viewer been consistent. I shall be glad for the locks I complain of to be placed before any practical impartial man you may think proper to appoint.

I understood Sir Thomas Hastings, when the lock-makers met him at Birmingham, that in cases of this description we were to appeal to Mr. Gunner. I should be glad to place the locks in question before that gentleman, and for him to report to your Honourable Board upon them.

I am, &c.

The Honourable Board of Ordnance. (signed) *John Duce.*

I HAVE the honour to report, for the Honourable Board's information, that I have investigated the alleged accusation by Mr. Duce, respecting the severe inspection and unfair rejection of his locks, and that I find that the principal rejections which have caused this complaint are in consequence of Mr. Duce sending in locks with the screws of a larger size and somewhat different thread to the pattern, and that there have been no locks rejected through imperfections in the machinery, but that a few locks were directed to be kept on the premises, (which were doubtful as to there being sufficient metal in the lock to form the joint against the barrel lump) until the machinery was properly adjusted for executing that work, which having been settled, these locks can be received.

With regard to the rejected locks, I would respectfully recommend that a few in which the difference in the size, &c., of the screws is very trifling, and will not affect the efficiency of the service, be accepted; but that Mr. Duce be cautioned to be more careful in his future supplies with regard to this particular point.

I also beg to state, that I have carefully examined the locks supplied by the other contractors, in comparison with those supplied by Mr. Duce, and I am of opinion that the locks supplied by Mr. Duce are generally in quality inferior to the other contractors' supplies, and that I consider the course of inspection impartial and just.

(signed) *James Gunner,*
For the Inspector of Small Arms.

(B—831.)

To the Honourable Board of Ordnance.

Gentlemen, Wolverhampton, 18 January 1854.

WE regret being under the necessity of informing you why our supply of the new rifle musket locks is short of the number we agreed to send. In the first place, there was a strike with the men refusing to file them for 6 *s.* each, the same that is paid at Enfield, and which was agreed by the lock contractors to be uniform, so that each one paid the same. However, in the course of about a month, some of our men commenced making them at 6 *s.*, and we expected they would have continued satisfied. But when the other contractors were aware we was progressing, they offered our men 6 *s.* 3 *d.*, and since have paid - - - - - - - - 6 *s.* 6 *d.* filing,

together with the forging	–	10
	7	4
leaving only	–	11 profit.
	8	3

Out of which we have to supply them with tools, fire, and oil. We employ a man constantly making tools at high wages for their use, free of cost, besides furnishing them with the tumblers swivelled at a less price than we pay to have it done. In order to assist the men and progress with the order, I should have said that as the greater part of the workmen could not swivel the tumblers, we thought proper to do them at less than cost price. Under these circumstances, we should feel obliged by your Honourable Board taking these things into consideration, and adopting such means as will enable us to have a fair and reasonable profit for our capital of 1 *s.* 6 *d.* per lock. We would beg leave to suggest that one uniform price should be paid by each contractor, and whoever deviated from that to be fined or otherwise, as your Honourable Board may think fit; at the same time I do not expect the men will make them for less than 6 *s.* 3 *d.*; and if there is not a check put to the system, we do not know where it will end. I should have stated that some of the contractors keep beershops, &c., from which they derive a profit from the men. If the price was adjusted as above stated, I have no doubt the trade would go on peaceably, and the order would be executed in due time.

We are, Gentlemen, &c.
(signed) *Joseph Brazier & Son.*

Appendix, No. 1.

(B—824.)

Sir, Wolverhampton, 16 January 1854.

In reply to your letter, I beg to inform you the delay of sending our supply is caused by the unwillingness of the men refusing to make the locks at the price we understood was to be paid, or in other words, the same as was paid at the manufactory at Enfield; and beg further to inform you, I intend waiting on the Honourable Board on Wednesday next, in order to further explain.

I am, Sir, &c.

G. Butler, Esq. (signed) *Joseph Brazier & Son.*

Barrels.

(F—1773.)

Sir, 8, Fisher-street, Birmingham, 16 January 1854.

In reply to yours of the 14th instant, we beg most respectfully to state the reason we have not done our quantity of rifle musket barrels is, we have had a breakage with our mill. We will do our quantity next month, and likewise the arrears which we are short this month, hoping the Honourable Board will excuse the delay, which we could not avoid.

We are, Sir, &c.

G. Butler, Esq. (signed) *Joseph Turner & Sons.*

(B—826.)

Sir, District Iron Works, Smethwick, 17 January 1854.

In reply to your favour of the 14th instant, we beg to inform the Honourable Board we have sent in a lot of 60 new rifle musket barrels last Wednesday, and we are glad to find the principal part were received to account.

We shall send in a further quantity to-morrow, and we trust most will be passed. We shall continue to send in a weekly supply, and trust to be enabled to give satisfaction.

The delay has been caused by a strike of our workmen, who, we are now glad to state, have returned to their employment.

We are, Sir, &c.

G. Butler, Esq. (signed) *Beasleys & Farmer.*

(M—3578.)

Sir, Aston Junction Mills, Birmingham, 16 January 1854.

In reply to your letter of the 14th instant, I am sorry to say the deficiency of the barrels agreed to be delivered by me has been occasioned by men, the grinders and tilers, turning out for price, but am happy to say they have all returned to work again, and hope now to send a sufficient supply to make up my complement, and more if required.

Remain, Sir, &c.

To G. Butler, Esq., London. signed) *Ezra Millwood.*

(C—5053.)

Sir, 274, New Town Row, Birmingham, 17 January 1854.

In answer to your inquiry respecting the delay with order $\frac{0}{411}$, for "Barrels, new rifle musket," I beg to inform you, that it was occasioned by the continued strike of our workmen. Allow me to add, that a satisfactory arrangement having been made them, they are now at work. I passed 54 barrels at view last week, and hope to send near 100 more for view this week, and have every reason to expect I shall very soon be able to make up the arrears.

I remain, &c.

G. Butler, Esq. (signed) *John Clive.*

(C—5054.)

Sir, 94, Baggot-street, Birmingham, 17 January 1854.

In answer to your communication of the 14th instant, I beg most respectfully to state that my non-fulfilment of your contract for last month, as per agreement, arose from two causes: the first was not being able to make the arrangement with my men so soon as I had anticipated, which, I am happy to say, I have now done, and last week I passed my number to account. I was also prevented, after I had arranged with my men, by the frost and want of coal. I am now at regular work, and have no doubt by the end of March to make up any deficiency that may now exist.

I have, &c.

(signed) *Henry Clive.*

BAYONETS.

(A—3066.)

Sir, 26, Edmund-street, Birmingham, 17 December 1853.

WITH reference to the Honourable Board's order for bayonets for new rifle muskets, dated 14th October 1853, our time having now expired since we were furnished with a pattern that we should have commenced our supplies, we beg to say, that not having made any of them in the previous order, it has taken us rather longer to commence than we anticipated; but shall be able to send some in in the course of next week, and shall esteem it a favour if the Honourable Board would be pleased to grant us two weeks from the above date before sending in our full numbers. We will then keep up our supplies, and will not exceed the whole time allotted us for the completion of the order.

We are, &c.

G. Butler, Esq. (signed) *R. & W. Aston.*

(R—1862.)

Dear Sir, West Bromwich, 3 February 1854.

IN reply to yours of the 1st instant, (S—3544), which we received to-day, respecting the proper supply of bayonets, we are sorry we have not delivered the proper quantity; but we have a great deal to contend with in getting them up, which we will respectfully state to you. Between the finish of one order and the coming out of another, we lose the best of our workmen, not having other employment for them, and are consequently obliged to get whoever we can, and it takes some time before we can get them into the proper mode of work. Another thing, the bayonets now being made are far superior to anything that has been made before; we have therefore great difficulty in getting men to finish and fit them properly. We hope to be able to make up the deficiency this month, and will do all we possibly can to do so. If you could allow us a little ease in the inspection we should be very thankful; being so much extra work in these bayonets, we have a many rejected for trifling faults. We do not wish you to take anything unserviceable or unsound, but if you could ease us a little until we get the men more into the work we should be very thankful.

Your obedient Servants,

(signed) *John Roe & Son.*

Mr. J. Wood. *G. W. & E. Roe.*

(R—1846.)

Dear Sir, West Bromwich, 16 January 1854.

IN reply to yours of the 14th instant, respecting the supply of bayonets for new rifle muskets, we are sorry we have been behind with the supply, but have had a great difficulty in procuring workmen; but are now in a better state to send in a good supply, and hope by the end of next month to make up all arrears, and continue a good supply afterwards until the whole is completed.

Your obedient Servants,

Mr. Geo. Butler. (signed) *G. & E. Roe.*

(H—664.)

Sir, Albion Works, Birmingham, 16 January 1854.

WE beg respectfully to acknowledge the receipt of your favour of the 14th inst., relative to the non-delivery of bayonets to the 7th inst., and to explain, as required, the reason of the delay. When we last had the honour of addressing you, we considered we should be able to commence our deliveries in a fortnight's time, but were met by the following obstacles, which we could not foresee, and not having any stock of bayonets, as other contractors, who had already made the article, were unable to overcome.

First, the iron (though obtained from one of the very best makers of it) turned out so exceedingly "grey" that the first lot of bayonets we made were comparatively useless. Secondly, the severe weather completely stopped our supply of coal, and consequently our works, as was the case with other manufacturers. And lastly, our blade-forger, the only one we have who can forge bayonet-blades, has had a severe illness for three weeks, and only returned to work on Saturday last. We have, with great anxiety and expense, laboured to accomplish a delivery, and should assuredly have done so but for the foregoing reasons. We shall without fail deliver some the ensuing week, and our first and best attention shall be given to the bayonet order, and no time whatever be lost in making up the arrears as quickly as possible.

We are, &c.

G. Butler, Esq. (signed) *Heighington & Lawrence.*

Appendix, No. 1.

RODS.

(G—693.)

Sir, 56, Staniforth-street, Birmingham, 16 January 1854.

IN reply to your letter of the 14th instant, relating to the Board's Order, dated 6th October 1853 (C—411), we beg to state, for the information of the Honourable Board of Ordnance, that we have been disappointed by two of our oldest rod-hands, who promised to come to work, but have not been near, and consequently we have lost considerable time in having to teach other men; and it being holiday time, we have experienced great difficulty in getting any of the men to work.

We have been at work at the rods ourselves, and we assure you that they are in a forward state; and we hope in the course of one month from this date to be able to make up the arrears, and continue to supply our regular quantities. Soliciting your kind indulgence,

We are, &c.
(signed) pro T. & C. Gilbert, *C. Thumam.*

G. Butler, Esq., Secretary to the Hon. Board of Ordnance.

SCREWS.

(G—692.)

Sir, West Bromwich, 16 January 1854.

IN reply to your favour respecting delivery of materials, the sizes of screws, &c., having been repeatedly objected to, is the cause of delay. We have a quantity now ready to send, and shall complete the remainder at once, and in the meantime

Remain, &c.
G. Butler, Esq. (signed) pro James Grice, *E. J. Grice.*

(O.)

(A—3741.)

COPY of LETTER from Messrs. *R. & W. Aston,* Contractors, respecting Musket Bayonets rejected.

Sir, 26, Edmund-street, Birmingham, 9 February 1854.

WE have this night forwarded, per rail, to your address, three new pattern rifled musket bayonets, which have been refused at the view-rooms here, for irregular grinding, and which we think ought to have been received, until such times as our men have had a little more practice, it not being at all detrimental to the service, and the best our present hands can do, it being a branch in which there is a great deficiency of good workmen; but as we are not prepared to prove them equal to pattern in that respect, we should be willing, if the Honourable Board should require it, until our men improve, to make an allowance of 3 *d.* each, although the cost to us will be the same now as then.

We should then be able to send in our quantities. An answer at your convenience will oblige,

Yours, &c.
J. Wood, Esq. (signed) *R. & W. Aston.*

P.S.—The head viewer here, Mr. Evans, examined them to-day, and his opinion coincided with our own.

(True copy.)

J. Wood, Secretary.

STATEMENT showing the Particulars of various CONTRACTS for Providing and Setting-up PERCUSSION ARMS, in the Years 1851, 1852, and 1853.—BIRMINGHAM.

700 CARBINES FOR CONSTABULARY.

SETTING-UP.—(Materials supplied from Store.)—Per Board's Order, dated the 26th September 1851, (O—813).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by the 26th December 1851.	Number actually Supplied by 26th December 1851.	Deficiency on the 26th December 1851.	Rejections up to the 26th December 1851.	REMARKS.
			s. d.					
Brookes & Son - -	Carbines, Constabulary - -	700	12 2	700	- - -	700	- - -	Completed, November 1852.
E.								

100 PISTOLS (POCKET) FOR CONSTABULARY.

SUPPLIED COMPLETE.—Per Board's Order, dated 6th October 1851, (P—1,312).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by 6th January 1852.	Number actually Delivered and Accepted by 6th January 1852.	Deficiency on the 6th January 1852.	Rejections up to the 6th January 1852.	REMARKS.
			s. d.					
Moore & Harris - -	Pistols, Pocket, complete -	100	22 -	100	19	81	- - -	Completed by 31st January 1852.

500 MUSKETS, ARTILLERY.

SETTING-UP.—(Materials supplied from Store.)—Per Board's Order, dated 5th July 1852, (C—2,605).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by		Number actually Delivered and Accepted by		Deficiencies on		Rejections up to		REMARKS.
				25 Sept. 1852.	16 Oct. 1852.	25 Sept. 1852.	16 Oct. 1852.	25 Sept. 1852.	16 Oct. 1852.	25 Sept. 1852.	16 Oct. 1852.	
			s. d.									
B. Woodward & Son -	Muskets, Artillery, set-up -	500	15 9	320	180	229	177	91	3	- -	- -	Completed by 31st October 1852.

10,000 MUSKETS, EXTRA SERVICE; 4,000 DITTO, SEA SERVICE.

BRASS WORK.—Per Board's Order, 4 November 1852, (O—1,095).

NAME of CONTRACTOR.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by 4th December 1852.	Number actually Delivered and Accepted by 4th December 1852.	Deficiencies on 4th December 1852.	Rejections up to 4th December 1852.	REMARKS.
W. H. Jennings	Pieces, side	6,500	9 *d.* per lb.	6,500	1,000	5,500	-	Completed by 31 December 1852.
	Plates — Heel	10,600		10,600	1,000	9,600	-	
	Plates — Trigger	6,500		6,500	1,000	5,500	-	

SIDE NAILS, &c.—Tenders accepted by the Board's Order, dated 8th November 1852, (C—2,782).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by 20th December 1852.	Number actually Delivered and Accepted by 20th December 1852.	Deficiencies on 20th December 1852.	Rejections up to 20th December 1852.	REMARKS.
R. & W. Aston	Nails, side	5,000	1*s.* 10*d.* per 100.	5,000	-	5,000	-	Completed by 31 January 1853.
	Springs, Bayonet	10,900	4½*d.* each	10,900	4,470	6,430	363	Ditto - - 28 February 1853.

The remainder of the materials supplied from Store.

SETTING-UP.—Tenders accepted by the Board's Order, dated the 5th November 1852, (O—1,096).

NAMES of CONTRACTORS.	Description of Work.	Number Ordered.		Price.		Number agreed to be Delivered by 24th March 1853.		Number actually Delivered and Accepted by 24th March 1853.		Deficiency on the 24th March 1853.		Rejections up to 24th March 1853.		REMARKS.
		Extra Service.	Sea Service.	Extra Service.	Sea Service.	Extra Service.	Sea Service.	Extra Service.	Sea Service.	Extra Service.	Sea Service.	Extra Service.	Sea Service.	
Hollis & Sheath	Setting-up	2,500	1,000	12*s.* 9*d.*	11*s.* 8*d.*	2,500	1,000	-	-	2,500	1,000	-	-	- - Completed extra service October 1853; sea service, September 1853.
Swinburn & Son	Ditto	2,500	1,000	-	-	2,500	1,000	28	574	2,472	426	-	-	- - Completed extra service October 1853; sea service, August 1853.
Tipping & Lawden	Ditto	2,500	1,000	-	-	2,500	1,000	-	154	2,500	846	-	-	- - Extra service not completed to 16th March 1854; sea service completed in January 1854.
T. Turner	Ditto	2,500	1,000	-	-	2,500	1,000	-	176	2,500	824	-	-	- - Completed extra service October 1853; sea service, September 1853.

Brass Work.—Tenders accepted by the Board's Order, dated 14th January 1853, (S—2,533).

NAME of CONTRACTOR.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by the 12th March 1853.	Number actually Delivered and Accepted by 12th March 1853.	Deficiency on the 12th March 1853.	Rejections up to 12th March 1853.	REMARKS.
M. S Hargrove - -	Brass work (recast) - -	*Sets.* 700	3 *d.* p' lb.	700	- - -	700	- - -	Completed by 24th March 1853.

Bayonets, &c.—Tenders accepted by the Board's Order, dated 31st January 1853, (C—2,374).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by		Number actually Delivered and Accepted by		Deficiencies on		Rejections up to		REMARKS.
				2 March.	14 March.	2 March.	14 March.	2 March.	14 March.	2 March.	14 March.	
Hill & Son - -	Bayonets - - -	100	3 *s.* 6 *d.*	100	- -	- -	- -	100	- -	- -	- -	Completed in July 1853.
R. & W. Aston -	Nails - - Breech	700	2 *s.* 6 *d.* per 100	- -	700	- -	- -	- -	700	- -	- -	ditto - in April 1853.
	Nails - - Side -	1,400		- -	1,400	- -	- -	- -	1,400	- -	- -	ditto - in April 1853.
	Screws - - Large -	1,400	3 *s.* 6 *d.* p' gross	- -	1,400	- -	- -	- -	1,400	- -	- -	ditto - in July 1853.
	Screws - - Small -	1,400	1 *s.* 6 *d.* ,,	- -	1,400	- -	- -	- -	1,400	- -	- -	
	Swivels - - Butt -	700	29/ per 100	- -	700	- -	- -	- -	700	- -	- -	ditto - in June 1853.
	Swivels - - Shaft -	700	12/6 ,,	- -	700	- -	- -	- -	700	- -	- -	
	Triggers - - - -	700	½ *d.* each	- -	700	- -	- -	- -	700	- -	- -	ditto - in April 1853.

Setting up.—Tenders accepted by the Board's Order, dated the 15th August 1853, (G—725).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by			Number actually Delivered and Accepted by			Deficiencies on			Rejections up to			REMARKS.
				12 Nov.	10 Dec.	24 Dec.	12 Nov.	10 Dec.	24 Dec.	12 Nov.	10 Dec.	24 Dec.	12 Nov.	10 Dec.	24 Dec.	
Hollis & Sheath - -	Setting up -	175	14 *s.* 6 *d.*	70	70	35	1	115	46	69	- -	- -	- -	- -	- -	Completed in February 1854.
Swinburn & Son -	- ditto - -	175	- -	70	70	35	4	41	98	66	29	- -	- -	- -	- -	ditto - in February 1854.
Tipping & Lawden -	- ditto - -	175	- -	70	70	35	10	150	6	60	- -	9	- -	- -	- -	- - One required to complete the order on 18 March 1854.
T. Turner - - -	- ditto - -	175	- -	70	70	35	5	64	87	65	6	- -	- -	- -	- -	Twelve - ditto - ditto.

800 PISTOLS, CONSTABULARY.

BRASS WORK.—Tender accepted by the Board's Order, dated 14 January 1853, (S.—2,533).

NAME of CONTRACTOR.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by the 12th March 1853.	Number actually Delivered and Accepted by 12th March 1853.	Deficiencies on the 12th March 1853.	Rejections up to 12th March 1853.	REMARKS.
S. Hargrove	Brass work (recast), sets	800	3 *d.* per lb.	800	-	800	-	Completed by 24th March 1853.

BARRELS.—Tenders accepted by the Board's Order, dated the 31st January 1853, (C.—2,374.)

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by		Number actually Delivered and Accepted by		Deficiencies on		Rejections up to		REMARKS.
				28 March.	25 April.	28 March.	25 April.	28 March.	25 April.	28 March.	25 April.	
Beasley & Farmer	Barrels	800	4 *s.*	400	400	93	402	307	-	81	121	Completed by 30th April 1853.

LOCKS.—Tenders accepted by the Board's Order, dated the 31st January 1853, (C.—2,374).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by		Number actually Delivered and Accepted by		Deficiencies on		Rejections up to		REMARKS.
				28 March.	4 April.	28 March.	4 April.	28 March.	4 April.	28 March.	4 April.	
James Francis	Locks, Pistol	400	6 *s.* 4 *d.*	320	80	218	-	102	80	52	-	Completed by 30th April 1853.
R. & W. Aston	- ditto	400	-	320	80	219	71	101	9	51	9	- Ditto - - ditto.

NAILS, &c.—Tenders accepted by the Board's Order, dated the 31st January 1853 (C—2,374).

NAME of CONTRACTOR.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by the 14th March 1853.	Number actually Delivered and Accepted by 14th March 1853.	Deficiencies on 14th March 1853.	Rejections up to 14th March 1853.	REMARKS.
R. & W. Aston -	Nails - - Breech -	800	2 *s.* 6 *d.* per 100.	800	- - -	800	- - -	Completed in April 1853.
	Nails - - Side -	800		800	- - -	800	- - -	
	Rammers with swivels -	800	10 *d.* each	800	- - -	800	- - -	Ditto in July 1853.
	Screws, Wood No. 2 -	800	1 *s.* per 100	800	- - -	800	- - -	Ditto in May 1853.
	Screws, Wood ,, 3 -	1,600		1,600	- - -	1,600	- - -	
	Screws, Wood ,, 4 -	1,600		1,600	- - -	1,600	- - -	
	Screws, Wood ,, 5 -	800	4 *s.* ,,	800	- - -	800	- - -	
	Springs, Rammer - -	800	1 ½ *d.* each	800	- - -	800	- - -	
	Swivels, Butt - - -	800	29 *s.* per 100	800	- - -	800	- - -	Ditto in June 1853.
	Triggers - - -	800	½ *d.* each	800	- - -	800	- - -	Ditto in April 1853.

SETTING-UP.—Tenders accepted by the Board's Order, dated 15th August 1853, (G—725).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by		Number actually Delivered and Accepted by		Deficiencies on the		Rejections up to		REMARKS.
				12th November.	19th November.	12th November.	19th November.	12th November.	19th November.	12th November.	19th November.	
			s. *d.*									
Hollis & Sheath -	Setting-up - - -	200	11 3	160	40	56	39	104	1	- - -	-	Completed in December 1853.
Swinburn & Son -	- ditto - - -	200	- -	160	40	43	18	117	22	- - -	-	
Tipping & Lawden -	- ditto - - -	200	- -	160	40	146	13	14	27	- - -	-	
T. Turner - - -	- ditto - - -	200	- -	160	40	80	- -	80	40	- - -	-	

50 CARBINES, DOUBLE BARRELLED (RIFLED), FOR CAPE CORPS.

BRASS WORK.—Tender accepted by the Board's Order, dated the 20th April 1853 (S—918).

NAME of CONTRACTOR.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by 26th May 1853.	Number actually Delivered and Accepted by 26th May 1853.	Deficiencies on the 26th May 1853.	Rejections up to	REMARKS.
S. Hargrove	Brass work (recast), sets	50	3 *d.* per lb.	50	-	50	-	Completed in June 1853.

BARRELS, &c.—Tenders accepted by the Board's Order, dated the 16th May 1853 (C—2,625); 27th May 1853 (C—2,714); 1st June 1853 (C—2,725); and 10th June 1853 (S—2,772).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by			Number actually Delivered and Accepted by			Deficiencies on the			Rejections up to			REMARKS.
				27th June.	8th July.	13th July.	27th June.	8th July.	13th July.	27th June.	8th July.	13th July.	27th June.	8th July.	13th July.	
Beasley & Farmer	Barrels, pairs	50	32 *s.*	-	-	50	-	-	-	-	-	50	-	-	-	Completed in February 1854.
Francis James	Locks ,,	50	15 *s.*	-	50	-	-	-	-	-	50	-	-	-	-	Ditto in November 1853.
T. & C. Gilbert	Rammers, No.	50	2 *s.* 3 *d.*	-	50	-	-	-	-	-	50	-	-	-	-	Ditto in March 1854.
	Springs for ditto	50	2 *d.*	-	50	-	-	-	-	-	50	-	-	-	-	Ditto in January 1854.
R. & W. Aston	Bolts, swaged	50	2 *s.* 6 *d.* per 100	50	-	-	-	-	-	50	-	-	-	-	-	Ditto in February 1854.
	Break-offs	50	7 *d.* each	50	-	-	-	-	-	50	-	-	-	-	-	Ditto in December 1853.
	Cocks, stamped, pairs	50	6 *d.* per pair	50	-	-	-	-	-	50	-	-	-	-	-	Ditto in February 1854.
	Nails — Breech	50	2 *s.* 6 *d.* per 100	50	-	-	-	-	-	50	-	-	-	-	-	Ditto in October 1853.
	Nails — Break-off	50	2 *s.* ,,	50	-	-	-	-	-	50	-	-	-	-	-	
	Nails — Side	50	2 *s.* 6 *d.* ,,	50	-	-	-	-	-	50	-	-	-	-	-	
	Nails — Pipe	50	1 *s.* 6 *d.* ,,	50	-	-	-	-	-	50	-	-	-	-	-	
	Screws — Large	100	2 *s.* 4 *d.* ,,	100	-	-	-	-	-	100	-	-	-	-	-	
	Screws — Small	200	1 *s.* ,,	200	-	-	-	-	-	200	-	-	-	-	-	
	Screws — Lock end	100	4 *s.* ,,	100	-	-	-	-	-	100	-	-	-	-	-	Ditto in January 1854.
	Sights, elevating	50	5 *s.* each	50	-	-	-	-	-	50	-	-	-	-	-	Ditto in February 1854.
	Triggers	50	3 ½ *d.* per pair	50	-	-	-	-	-	50	-	-	-	-	-	Ditto in October 1853.

SETTING-UP.—The setting-up of these Carbines is now being proceeded with agreeably to the Board's Order of 13th October 1853 (H—997). No time has been specified for their completion.

500 CARBINES FOR CONSTABULARY.

BARRELS.—Tenders accepted by the Board's Order, dated the 16th May 1853 (C—2,652).

NAME of CONTRACTOR.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by		Number actually Delivered and Accepted by		Deficiencies on		Rejections up to		REMARKS.
				16th July.	30th July.	16th July.	30th July.	16th July.	30th July.	16th July.	30th July.	
Beasley & Farmer - -	Barrels, Carbine - -	550	*s. d.* 8 –	400	150	- -	- -	400	150	- -	- -	Seven required to complete the order on 18th March 1854.

BAYONETS, &c.—Tenders accepted by the Board's Order, dated the 16th May 1853 (C—2,652).

NAME of CONTRACTOR.	DESCRIPTION of WORK	Number Ordered.	Price.	Number agreed to be Delivered by 27th June 1853.	Number actually Delivered and Accepted by 27th June 1853.	Deficiencies on the 27th June 1853.	Rejections up to 27th June 1853.	REMARKS.
Hill & Son - -	Bayonets - - -	520	3*s.* 6*d.*	520	- - -	520	- - -	Completed in November 1853.
R. & W. Aston -	Nails - Breech - -	500	2*s.* 6*d.* per 100	500	- - -	500	- - -	Ditto in September 1853.
	Nails - Side - -	1,000		1,000	- - -	1,000	- - -	
	Screws - Large - -	1,000	2*s.* 4*d.* per 100	1,000	- - -	1,000	- - -	Ditto in October 1853.
	Screws - Small - -	1,500	1*s.* per 100	1,500	- - -	1,500	- - -	
	Swivels - Butt - -	500	3½*d.* each	500	- - -	500	- - -	Ditto in October 1853.
	Swivels - Shaft - -	500	1½ „	500	- - -	500	- - -	Ditto in September 1853.
	Triggers - - -	500	½ „	500	- - -	500	- - -	Ditto in October 1853.

BRASS WORK.—Tenders accepted by the Board's Order, dated 20th April 1853 (S—912).

NAME of CONTRACTOR.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by the 16th June 1853.	Number actually Delivered and Accepted by 16th June 1853.	Deficiencies on 16th June 1853.	Rejections up to 16th June 1853.	REMARKS.
S. Hargrove - -	Brass work (recast), sets -	500	3 *d.* per lb.	500	- - -	500	- - -	Completed by 30th of June 1853.

The SETTING-UP of these Carbines is now being proceeded with agreeably to the Board's Order, dated 13th October 1853 (H—997). No time has been specified for completion.

500 CARBINES, DOUBLE BARRELLED.

BARRELS.—Tender accepted by the Board's Order, dated the 1st June 1853 (C—2,724).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by				Number actually Delivered and Accepted by				Deficiencies on				Rejections up to				REMARKS.
				16 July.	13 Aug.	10 Sept.	17 Sept.	16 July.	13 Aug.	10 Sept.	17 Sept.	16 July.	13 Aug.	10 Sept.	17 Sept.	16 July.	13 Aug.	10 Sept.	17 Sept.	
Beasley & Farmer	Barrels, pairs	500	32 *s.*	50	200	200	50	—	4	71	30	50	196	129	20	—	9	42	14	Completed March 1854.

LOCKS.—Tenders accepted by the Board's Order, dated 27th May 1853 (C—2,714).

NAME of CONTRACTOR.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by				Number actually Delivered and Accepted by				Deficiencies on				Rejections up to				REMARKS.
				9 July.	6 Aug.	3 Sept.	10 Sept.	9 July.	6 Aug.	3 Sept.	10 Sept.	9 July.	6 Aug.	3 Sept.	10 Sept.	9 July.	6 Aug.	3 Sept.	10 Sept.	
W. Corbett	Locks, pairs	500	14 *s.* 5 *d.*	50	200	200	50	10	31	46	26	40	169	154	24	11	19	21	14	Completed March 1854.

RAMMERS, &c.—Tenders accepted by the Board's Orders, dated 16th May 1853, (C—2,652), and 27th May 1853 (C—2,714).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by		Number actually Delivered and Accepted by		Deficiencies on		Rejections up to		REMARKS.
				9th July	27th June.	9th July.	27 June.	9 July.	27th June.	9th July.	27th June.	
R. & W. Aston	Break-offs	500	7 *d.*	-	500	-	-	-	500	-	-	Completed in November 1853.
	Cocks, pairs	500	6 *d.*	-	500	-	-	-	500	-	-	Ditto - in September 1853.
	Nails - Breech	500	2 *s.* 6 *d.* p' 100	-	500	-	-	-	500	-	-	Ditto in October 1853.
	Nails - Break-off	500	2 *s.* „ „	-	500	-	-	-	500	-	-	
	Nails - Side	500	2 *s.* 6 *d.* „ „	-	500	-	-	-	500	-	-	
	Nails - Pipe	500	1 *s.* 6 *d.* „ „	-	500	-	-	-	500	-	-	
	Screws - Large	1,000	2 *s.* 4 *d.* „ „	-	1,000	-	-	-	1,000	-	-	
	Screws - Small	2,000	1 *s.* „ „	-	2,000	-	-	-	2,000	-	-	
	Screws - Lock end	1,000	4 *s.* „ „	-	1,000	-	-	-	1,000	-	-	Ditto in January 1854.
	Triggers, pairs	500	3 ½ *d.* per pair.	-	500	-	-	-	500	-	-	Ditto in October 1853.
T. & C. Gilbert	Rammers with swivels	500	2 *s.* 3 *d.* each.	500	-	1	-	499	-	-	-	Ditto in March 1854.
	Springs for ditto	500	2 *d.* each.	500	-	1	-	499	-	-	-	Ditto in December 1853.

500 CARBINES, DOUBLE BARRELLED.

BRASS WORK.—Tenders accepted by the Board's Order, dated 20th April 1853 (S—912).

NAME of CONTRACTOR.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by the 16th June 1853.	Number actually Delivered and Accepted by 16 June 1853.	Deficiency on 16 June 1853.	Rejections up to 16 June 1853.	REMARKS.
S. Hargrove - - -	Brass Work (recast) - -	*Sets.* 500	3 *d.* per lb.	500	- - -	500	- - -	Completed by 30th June 1853.

SETTING-UP.—The Setting-up of these Carbines is now being proceeded with agreeably to the Board's Order, dated 13th October 1853 (H—997). No time has been stipulated for their completion.

3,000 PISTOLS, SEA SERVICE.

BARRELS.—Tenders accepted by the Board's Order, dated 1st June 1853 (C—2,720).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by					Number actually Delivered and Accepted by					Deficiencies on					Rejections up to					REMARKS.
				6 August.	3 Sept.	1 October.	29 October.	19 Nov.	6 August.	3 Sept.	1 October.	29 October.	19 Nov.	6 August.	3 Sept.	1 October.	29 October.	19 Nov.	6 August.	3 Sept.	1 October.	29 October.	19 Nov.	
Beasley & Farmer -	Barrels, Pistol -	3,000	*s. d.* 4 6	640	640	640	640	440	–	–	580	1,517	620	640	640	60	–	–	–	–	175	501	222	5 required to complete this order.

LOCKS.—Tenders accepted by the Board's Order, dated 1st June 1853 (C—2,720).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by					Number actually Delivered and Accepted by					Deficiencies on					Rejections up to					REMARKS.
				30 July.	27 August.	24 Sept.	22 October.	12 Nov.	30 July.	27 August.	24 Sept.	22 October.	12 Nov.	30 July.	27 August.	24 Sept.	22 October.	12 Nov.	30 July.	27 August.	24 Sept.	22 October.	12 Nov.	
J. Francis & Son -	Locks, Pistol - -	3,000	*s. d.* 6 4	640	640	640	640	440	–	–	570	839	676	640	640	70	–	–	–	–	142	118	65	Completed in March 1854.

3,000 PISTOLS, SEA SERVICE.

RAMMERS, &c.—Tenders accepted by the Board's Orders, dated 11th May 1853 (T—997), 1st June 1853 (C—2,720), and 29th July 1853, (A—2,968).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by			Number actually Delivered and Accepted by			Deficiencies on			Rejections up to			REMARKS.
				13th July.	9th Sept.	30th Sept.	13th July.	9th Sept.	30th Sept.	13th July.	9th Sept.	30th Sept.	13th July	9th Sept.	30th Sept.	
R. & W. Aston	Rammers with Swivels	3,000	1 *s.*	3,000	- -	- -	- -	- -	- -	3,000	- -	- -	- -	- -	- -	- - 1,500 required to complete this order.
	Springs for ditto -	3,000	1 ½ *d.*	3,000	- -	- -	- -	- -	- -	3,000	- -	- -	- -	- -	- -	Completed in February 1854.
T. & C. Gilbert	Rings, Swivel - -	3,000	2 *d.*	3,000	- -	- -	- -	- -	- -	3,000	- -	- -	- -	- -	- -	Ditto - - - ditto.
	Ribs, Side - -	3,000	4 ½ *d.*	3,000	- -	- -	- -	- -	- -	3,000	- -	- -	- -	- -	- -	- - 938 required to complete this order.
	Nails - Breech -	3,000	2 *s.* 6 *d.* per 100	- -	3,000	- -	- -	- -	- -	- -	3,000	- -	- -	- -	- -	Completed in October 1853.
	Nails - Side - -	3,000		- -	3,000	- -	- -	- -	- -	- -	3,000	- -	- -	- -	- -	
J. Grice - -	Screws - No. 2 -	6,000	1 *s.* per 100	- -	6,000	- -	- -	- -	- -	- -	6,000	- -	- -	- -	- -	Ditto - in March 1854.
	Screws - No. 3 -	6,000		- -	6,000	- -	- -	- -	- -	- -	6,000	- -	- -	- -	- -	
	Screws - No. 4 -	6,000		- -	6,000	- -	- -	- -	- -	- -	6,000	- -	- -	- -	- -	
	Screws - No. 5 -	3,000	4 *s.* ,,	- -	3,000	- -	- -	- -	- -	- -	3,000	- -	- -	- -	- -	
	Triggers - - -	3,000	½ *d.*	- -	3,000	- -	- -	- -	- -	- -	3,000	- -	- -	- -	- -	Ditto - - - ditto.
W. H. Jennings -	Brass Work (recast) -	3,000 sets.	3 *d.* per lb.	- -	- -	3,000	- -	- -	- -	- -	- -	3,000	- -	- -	- -	Ditto - in October 1853.

SETTING-UP.—This Order has been suspended to make way for more pressing services.

800 PISTOLS, CARBINE BORE.

BARRELS.—Tender accepted by the Board's Order, dated 16th May 1853 (C—2,652).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by		Number actually Delivered and Accepted by		Deficiencies on		Rejections up to		REMARKS.
				16th July.	23d July.	16th July.	23d July.	16th July.	23d July.	16th July.	23d July.	
Beasley & Farmer - -	Barrels, Pistol - - -	800	*s.* *d.* 4 6	640	160	337	74	303	86	148	26	Completed in September 1853.

800 PISTOLS, CARBINE BORE.

LOCKS.—Tender accepted by the Board's Order, dated 27th May 1853 (C—2,714).

NAME of CONTRACTOR.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by		Number actually Delivered and Accepted by		Deficiency on		Rejections up to		REMARKS.
				20th August.	27th August.	20th August.	27th August.	20th August.	27th August.	20th August.	27th August.	
James Francis - -	Locks - - - -	800	6 *s.* 4 *d.*	640	160	728	72	- -	- -	197	20	—

RAMMERS, &c.—Tenders accepted by the Board's Order, dated 16th May 1853 (C—2,652).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by		Number actually Delivered and Accepted by		Deficiencies on		Rejections up to		REMARKS.
				16th June.	27th June.	16th June.	27th June.	16th June.	21st June.	16th June.	21st June.	
R. & W. Aston - -	Nails - - Breech	800	- - 2 *s.* 6 *d.*	- -	800	- -	- -	- -	800	- -	- -	Completed in October 1853.
	Nails - - Side	800	per 100	- -	800	- -	- -	- -	800	- -	- -	Ditto in August 1853.
	Rammers with Swivels -	800	10 *d.*	- -	800	- -	- -	- -	800	- -	- -	Ditto in September 1853.
	Screws - - No. 2	800	1 *s.* per 100	- -	800	- -	- -	- -	800	- -	- -	Ditto in October 1853.
	Screws - - No. 3	1,600		- -	1,600	- -	- -	- -	1,600	- -	- -	
	Screws - - No. 4	1,600	- „ -	- -	1,600	- -	- -	- -	1,600	- -	- -	
	Screws - - No. 5	800	4 *s.* per 100	- -	800	- -	- -	- -	800	- -	- -	
	Springs, Rammer - -	800	1½ *d.* each -	- -	800	- -	- -	- -	800	- -	- -	Ditto in July 1853.
	Swivels, Butt - - -	800	3½ *d.* „ -	- -	800	- -	- -	- -	800	- -	- -	Ditto in September 1853.
	Triggers - - - -	800	½ *d.* „ -	- -	800	- -	- -	- -	800	- -	- -	Ditto - - ditto.
S. Hargrove - -	Brass Work (recast) Sets -	800	3 *d.* per lb. -	800	- -	- -	- -	800	- -	- -	- -	Ditto by 30th June 1853.

SETTING-UP.—The Setting-up of these Pistols is now in progress agreeably to the Board's Order, dated 13th October 1853 (H—997). No time specified for completion.

100 PISTOLS, CARBINE BORE.

BARRELS, &c.—Tenders accepted by the Board's Orders, dated the 20th April 1853 (S—911), and 16th May 1853 (C—2,654).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by		Number actually Delivered and Accepted by		Deficiencies on		Rejections up to		REMARKS.
				13th June.	16th June.	13th June.	16th June.	13th June.	16th June.	13th June.	16th June.	
Beasley & Farmer	Barrels	100	4 *s.* 6 *d.*	100	- -	- -	- -	100	- -	- -	- -	Completed in September 1853.
	Locks	100	6 *s.* 4 *d.*	100	- -	100	- -	- -	- -	40	—	
	Nails - Breech	100	2 *s.* per 100	100	- -	- -	- -	100	- -	- -	- -	
	Nails - Side	100		100	- -	- -	- -	100	- -	- -	- -	
	Rammers, with swivels	100	10 *d.*	100	- -	- -	- -	100	- -	- -	- -	
R. & W. Aston	Screws - No. 2	100	1 *s.* per 100	100	- -	- -	- -	100	- -	- -	- -	Ditto in October 1853.
	Screws - „ 3	200		200	- -	- -	- -	200	- -	- -	- -	
	Screws - „ 4	200		200	- -	- -	- -	200	- -	- -	- -	
	Screws - „ 5	100	4 *s.* „	100	- -	- -	- -	100	- -	- -	- -	
	Springs, Rammer	100	1 ½ *d.* each	100	- -	- -	- -	100	- -	- -	- -	Ditto in July 1853.
	Swivels, Butt	100	3 ½ *d.* „	100	- -	- -	- -	100	- -	- -	- -	Ditto in October 1853.
	Triggers	100	½ *d.* „	100	- -	- -	- -	100	- -	- -	- -	Ditto - ditto.
S. Hargrove	Brass work (recast)	100 sets	3 *d.* per lb.	- -	100	- -	- -	- -	100	- -	- -	Ditto by 30th June 1853.

The Setting-up of these Pistols is now being proceeded with agreeably to the Board's Order, dated 13th October 1853 (H—997).

30 PISTOLS, CARBINE BORE.

BARRELS, &c.—Tenders accepted by the Board's Order, dated 27th June 1853 (C—2,799).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by		Number actually Delivered and Accepted by		Deficiencies on		Rejections up to		REMARKS.
				12th July.	25th August.	12th July.	25th August.	12th July.	25th August.	12th July.	25th August.	
Beasley & Farmer	Barrels	30	4 *s.* 6 *d.*	- -	30	- -	- -	- -	30	- -	- -	Completed in October 1853.
J. Francis	Locks	30	6 *s.* 4 *d.*	30	- -	30	- -	- -	- -	5	—	
	Nails - Breech	30	2 *s.* 6 *d.* p' 100	30	- -	- -	- -	30	- -	- -	- -	
	Nails - Side	30		30	- -	- -	- -	30	- -	- -	- -	Ditto in July 1853.
	Rammers, with swivels	30	10 *d.*	30	- -	- -	- -	30	- -	- -	- -	
R. & W. Aston	Swivels, Butt	30	3 ½ *d.*	30	- -	- -	- -	30	- -	- -	- -	Ditto in September 1853.
	Screws, Nos. 2, 3, 4	150	1 *s.* per 100	150	- -	- -	- -	150	- -	- -	- -	Ditto in July 1853.
	Ditto, No. 5	30	4 *s.* „	30	- -	- -	- -	30	- -	- -	- -	Ditto in September 1853.
	Springs, Rammer	30	1 ½ *d.* each	30	- -	- -	- -	30	- -	- -	- -	Ditto in July 1853.
	Triggers	30	½ *d.* „	30	- -	- -	- -	30	- -	- -	- -	Ditto in September 1853.

30 PISTOLS, CARBINE BORE.

Brass Work.—30 Sets supplied by Mr. S. Hargrove, without stipulation as to time.

The Setting-up of these Pistols is now being proceeded with agreeably to the Board's Order, dated 13th October 1853, (H--997).

100 CARBINES, DOUBLE BARREL.

Barrels, &c.—Tenders accepted by the Board's Orders, dated 29th July 1853, (C—2,855), 3d August 1853, (C—2,865), 10th August 1853, (C—2,855), and 6th October 1853, (C—2,566).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Number Ordered.	Price.	Number agreed to be Delivered by				Number actually Delivered and Accepted by				Deficiencies on				Rejections up to				REMARKS.
				9 Sept.	21 Sept.	5 Oct.	17 Nov.	9 Sept.	21 Sept.	5 Oct.	17 Nov.	9 Sept.	21 Sept.	5 Oct.	17 Nov.	9 Sept.	21 Sept.	5 Oct.	17 Nov.	
R. & W. Aston	Bolts	50	½ *d.* each	50	–	–	–	–	–	–	–	50	–	–	–	–	–	–	–	Completed in December 1853.
	Break-offs	100	8 *d.* „	100	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–	Ditto - by 30 November 1853.
	Cocks, pairs	100	8 *d.* „	100	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–	Ditto - by 30 November 1853.
	Nails - Breech	100	2/6 per 100	100	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–	Ditto - in December 1853.
	Nails - Break-off	100	2/ „	100	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–	
	Nails - Rib	50	2/ „	50	–	–	–	–	–	–	–	50	–	–	–	–	–	–	–	Ditto - in February 1854.
	Nails - Pipe	100	1/6 „	100	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–	Ditto - in December 1853.
	Nails - Side	100	2/6 „	100	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–	
	Rammers, with swivels	50	2/3 each	50	–	–	–	–	–	–	–	50	–	–	–	–	–	–	–	Ditto - in March 1854.
	Ditto - without ditto	50	10 *d.* „	50	–	–	–	–	–	–	–	50	–	–	–	–	–	–	–	Ditto - in January 1854.
	Ribs, with rings	50	7 *d.* „	50	–	–	–	–	–	–	–	50	–	–	–	–	–	–	–	Ditto - in January 1854.
	Screws - Large	200	3/ per 100	200	–	–	–	–	–	–	–	200	–	–	–	–	–	–	–	Ditto - in December 1853.
	Screws - Small	400	1/ „	400	–	–	–	–	–	–	–	400	–	–	–	–	–	–	–	
	Screws - Lock end	200	4/ „	200	–	–	–	–	–	–	–	200	–	–	–	–	–	–	–	Ditto - in January 1854.
	Swivels - Butt	50	4 *d.* each.	50	–	–	–	–	–	–	–	50	–	–	–	–	–	–	–	Ditto - in February 1854.
	Swivels - Pipe	50	2 *d.* „	50	–	–	–	–	–	–	–	50	–	–	–	–	–	–	–	
	Springs, Rammer	100	2 *d.* „	100	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–	
	Triggers, pairs	100	3 ½ *d.* per pair	100	–	–	–	–	–	–	–	100	–	–	–	–	–	–	–	Ditto - in December 1853.
W. H. Jennings	Brass work, sets	100	11 *d.*	–	100	–	–	–	100	–	–	–	–	–	–	–	–	–	–	Ditto - by 30 September 1853.
J. & E. Partridge	Locks, pairs	100	15/ per pair	–	–	100	–	–	–	40	–	–	–	60	–	–	–	28	–	Ditto - in October 1853.
W. Millward	Barrels - with bar	50	38/6	–	–	50	–	–	–	–	–	–	50	–	–	–	–	–	–	Ditto - in February 1854.
	Barrels - without do.	50	32/	–	–	50	–	–	–	–	–	–	50	–	–	–	–	–	–	- - One pair required to complete this order.
Reeves & Greaves	Swords, bayonet	50	10/	–	–	–	50	–	–	–	–	–	–	–	50	–	–	–	–	Completed in January 1854.

Setting-up.—The Setting-up is now being proceeded with agreeably to the Board's Order, dated 13 October 1853 (H—997).

Small Arms Office, Birmingham,
20 March 1854.

R. W. Gunner,
Inspector of Small Arms.

STATEMENT, showing the Particulars of the CONTRACTS for Providing 23,000 Musket Rifles, Pattern 1851, ·702 Bore; and 2,000 Rifled Carbines, ·577 Bore, for the Royal Artillery.—BIRMINGHAM.

Memorandum.—The Dates printed within parentheses, in *Italics*, show the periods by which the several Articles should have been delivered.

MUSKET RIFLES, Pattern 1851, ·702 Bore.

BARRELS.—TENDERS accepted by the Board's Order, dated 6 June 1851 (S—1,361).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Numbers Ordered.	Price.	Numbers agreed to be Delivered by								Numbers actually Delivered and Accepted by								Deficiencies up to								Rejections up to								REMARKS.
				2 Aug. 1851.	30 Aug. 1851.	27 Sept. 1851.	25 Oct. 1851.	22 Nov. 1851.	20 Dec. 1851.	17 Jan. 1852.	21 Feb. 1852.	2 Aug. 1851.	30 Aug. 1851.	27 Sept. 1851.	25 Oct. 1851.	22 Nov. 1851.	20 Dec. 1851.	17 Jan. 1852.	21 Feb. 1852.	2 Aug. 1851.	30 Aug. 1851.	27 Sept. 1851.	25 Oct. 1851.	22 Nov. 1851.	20 Dec. 1851.	17 Jan. 1852.	21 Feb. 1852.	2 Aug. 1851.	30 Aug. 1851.	27 Sept. 1851.	25 Oct. 1851.	22 Nov. 1851.	20 Dec. 1851.	17 Jan. 1852.	21 Feb. 1852.	
			s.																															
Millward, Ezra	- - Barrels in the filed state.	3,286	13	400	400	400	400	400	100	400	486	144	294	236	203	171	65	139	331	256	106	164	197	229	335	261	155	241	266	344	387	359	229	199	369	Supply completed in June 1852. (21 *February* 1852.)
Beasley & Farmer	- Ditto - -	3,286	13	400	400	400	400	400	400	400	486	79	244	164	117	172	67	120	158	321	156	236	283	228	333	280	328	226	264	247	260	382	332	290	302	Supply completed in August 1852. (21 *February* 1852.)
Deakin & Sons	- Ditto - -	3,286	13	400	400	400	400	400	400	400	486	133	225	263	271	244	92	211	398	267	175	137	129	156	308	189	88	396	333	307	329	341	218	143	312	Supply completed in June 1852. (21 *February* 1852.)
Clive, Henry	- Ditto - -	3,286	13	400	400	400	400	400	400	400	486	95	222	232	244	175	43	57	382	305	178	168	156	225	357	343	104	230	319	278	296	360	225	266	267	Supply completed in June 1852. (21 *February* 1852.)
Millward, W.	- Ditto - -	3,286	13	400	400	400	400	400	400	400	486	212	270	229	142	217	145	290	308	188	130	171	258	183	255	110	178	257	285	263	258	266	232	301	441	Supply completed in June 1852. (21 *February* 1852.)
Clive, J.	- Ditto - -	3,285	13	400	400	400	400	400	400	400	485	42	264	264	262	154	25	79	267	358	136	136	138	246	375	321	218	298	296	276	338	261	107	146	344	Supply completed in June 1852. (21 *February* 1852.)
Turner & Sons	- Ditto - -	3,285	13	400	400	400	400	400	400	400	485	66	212	320	227	216	58	212	374	334	188	80	173	184	342	188	111	217	182	217	296	330	202	208	275	Supply completed in June 1852. (21 *February* 1852.)

BAYONETS.—(First Contract.)—TENDERS accepted by the Board's Order, dated 5 January 1852 (C—2,324), and 7 January 1852 (D—1,363).

NAMES of CONTRACTORS.	DESCRIPTION of ARTICLES.	Numbers Ordered.	Price.	Number agreed to be Delivered by			Number actually Delivered and Accepted by			Deficiencies on			Rejections up to			REMARKS.
				3 April 1852.	1 May 1852.	29 May 1852.	3 April 1852.	1 May 1852.	29 May 1852.	3 April 1852.	1 May 1852.	29 May 1852.	3 April 1852.	1 May 1852.	29 May 1852.	
			s. d.													
Hill, S., & Son	Bayonets, Musket	1,666	2 10	1,000	666	- -	1,042	566	- -	- -	58	- -	1,959	737	- -	Supply completed in May 1852.—(29 *May* 1852.)
Aston, R. & W.	- Ditto - -	1,664	2 10	832	832	- -	82	223	- -	750	609	- -	163	107	- -	- - Ditto - - Aug. 1852.—(29 *May* 1852.)
Roe, G. & E.	- Ditto - -	1,664	2 1	832	832	- -	598	589	- -	234	243	- -	746	452	- -	- - Ditto - - May 1852.—(29 *May* 1852.)
Roe, J., & Son	- Ditto - -	1,664	2 10	832	832	- -	879	468	- -	- -	317	- -	996	422	- -	- - Ditto - - May 1852.—(29 *May* 1852.)
Heighington & Co.	- Ditto - -	1,998	2 10	888	888	222	526	148	146	362	740	76	1,036	511	320	- - Ditto - - July 1852.—(29 *May* 1852.)
Salter, G., & Co.	- Ditto - -	1,666	2 10	952	714	- -	546	360	- -	406	354	- -	937	340	- -	- - Ditto - - June 1852.—(29 *May* 1852.)
Deakin & Sons	- Ditto - -	1,666	2 10	1,000	666	- -	422	451	- -	578	215	- -	433	439	- -	- - Ditto - - June 1852.—(29 *May* 1852.)

BAYONETS.—(Second Contract).—Tenders accepted by the Board's Order, dated 28th May 1852 (C—2,539).

NAMES of CONTRACTORS.	DESCRIPTION of ARTICLES.	Numbers Ordered.	Price.	Number agreed to be Delivered by					Number actually Delivered and Accepted by					Deficiencies on					Rejections up to					REMARKS.
				31 July 1852.	28 Aug. 1852.	25 Sept. 1852.	23 Oct. 1852.	20 Nov. 1852.	31 July 1852.	28 Aug. 1852.	25 Sept. 1852.	23 Oct. 1852.	20 Nov. 1852.	31 July 1852.	28 Aug. 1852.	25 Sept. 1852.	23 Oct. 1852.	20 Nov. 1852.	31 July 1852.	28 Aug. 1852.	25 Sept. 1852.	23 Oct. 1852.	20 Nov. 1852.	
			s. d.																					
Hill & Son -	Bayonets, Musket	2,609	2 10	800	800	800	209	–	810	800	795	214	–	–	–	5	–	–	551	606	608	253	–	
Roe, J., & Son -	- ditto - -	2,609	2 10	800	800	800	209	–	1,300	1,040	269	–	–	–	–	–	–	–	538	388	48	–	–	
Roe, G. & E. -	- ditto - -	1,100	2 10	400	400	300	–	–	400	400	300	–	–	–	–	–	–	–	241	109	50	–	–	- - Messrs. G. & E. Roe's contract reduced from 2,609 to 1,100. *Vide* subsequent contract.
Salter, G., & Co.	- ditto - -	2,609	2 10	600	600	600	600	209	600	559	263	289	592	–	41	332	111	–	249	302	217	409	173	- - Supply completed in December 1852.
Deakin & Son -	- ditto - -	2,609	2 10	600	600	600	600	209	454	600	449	467	630	146	–	151	123	–	199	166	459	370	238	(*The whole by* 20 *November* 1852.)

BAYONETS.—(Third Contract).—Tenders accepted by the Board's Order, dated 8th September 1852 (S—2,726).

NAMES of CONTRACTORS.	DESCRIPTION of ARTICLES.	Numbers Ordered.	Price.	Number agreed to be Delivered by 30 October 1852.	Number actually Delivered and Accepted by 30 October 1852.	Deficiency on 30 October 1852.	Rejections up to 30 October 1852.	REMARKS.
Hill, S., & Son - -	Bayonets, Musket - -	400	2 *s.* 10 *d.*	400	400	- - -	507	(*By* 30 *October* 1852.)
Roe, J., & Son - - -	- ditto - - -	409	2 *s.* 10 *d.*	409	409	- - -	122	(*By* 30 *October* 1852.)
Salter, G., & Co. - -	- ditto - - -	350	2 *s.* 10 *d.*	350	- - -	350	- - -	Supply completed in December 1852. (*By* 30 *October* 1852.)
Deakin, W., & Son - -	- ditto - - -	350	2 *s.* 10 *d.*	350	- - -	350	- - -	- ditto - ditto December 1852. (*By* 30 *October* 1852.)

SIGHTS, BACK ELEVATING.—Tenders accepted by the Board's Order, dated 24th June 1851 (A—2,764).

NAMES of CONTRACTORS.	DESCRIPTION of ARTICLES.	Numbers Ordered.	Price.	Number Agreed to be Delivered by							Number actually Delivered and Accepted by							Deficiencies on							Rejections up to							REMARKS.
				21 Aug. 1851.	18 Sept. 1851.	16 Oct. 1851.	13 Nov. 1851.	11 Dec. 1851.	8 Jan. 1852.	5 Feb. 1852.	21 Aug. 1851.	18 Sept. 1851.	16 Oct. 1851.	13 Nov. 1851.	11 Dec. 1851.	8 Jan. 1852.	5 Feb. 1852.	21 Aug. 1851.	18 Sept. 1851.	16 Oct. 1851.	13 Nov. 1851.	11 Dec. 1851.	8 Jan. 1852.	5 Feb. 1852.	21 Aug. 1851.	18 Sept. 1851.	16 Oct. 1851.	13 Nov. 1851.	11 Dec. 1851.	8 Jan. 1852.	5 Feb. 1852.	
			s. d.																												
Aston, R. & W. -	Sights, Elevating	23,000	4 –	2,800	2,800	4,000	4,000	4,000	4,000	1,400	127	194	779	1,165	1,507	1,044	1,182	2,673	2,606	3,221	2,835	2,493	2,956	218	252	611	513	520	1,151	1,168	1,641	- Price subsequently increased to 4 *s.* 6 *d.* per B. O., 12 May 1852 (A—2,948). Supply completed in September 1852. (5 *February* 1852.)

MUSKET RIFLES, Pattern 1851, ·702 Bore—*continued.*

23,000 BRASS HEEL PLATES, supplied by Contract, by Mr. *H. Jennings*, of *Birmingham*, agreeably to the Board's Order, 7 February 1852 (S—2,422). No Time for Delivery specified. The remaining Brass Work, and other Materials, supplied from Store.

SETTING UP.—TENDERS accepted by the Board's Order, dated 4 February 1852 (C—2375).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Numbers Ordered.	Price.	Number agreed to be Delivered by												Number actually Delivered and Accepted by												Deficiency on												Rejections up to												REMARKS.
				3 July 1852.	31 July 1852.	28 Aug. 1852.	25 Sept. 1852.	23 Oct. 1852.	20 Nov. 1852.	18 Dec. 1852.	15 Jan. 1853.	12 Feb. 1853.	12 Mar. 1853.	23 April 1853.		3 July 1852.	31 July 1852.	28 Aug. 1852.	25 Sept. 1852.	23 Oct. 1852.	20 Nov. 1852.	18 Dec. 1852.	15 Jan. 1853.	12 Feb. 1853.	12 Mar. 1853.	23 April 1853.		3 July 1852.	31 July 1852.	28 Aug. 1852.	25 Sept. 1852.	23 Oct. 1852.	20 Nov. 1852.	18 Dec. 1852.	15 Jan. 1853.	12 Feb. 1853.	12 Mar. 1853.	23 April 1853.		3 July 1852.	31 July 1852.	28 Aug. 1852.	25 Sept. 1852.	23 Oct. 1852.	20 Nov. 1852.	18 Dec. 1852.	15 Jan. 1853.	12 Feb. 1853.	12 Mar. 1853.	23 April 1853.	
			s. d.																																														
Hollis & Sheath	Setting up	5,750	23 6	500	500	500	500	500	500	500	500	500	500	750		1	25	43	225	399	738	778	448	518	692	1112		499	475	457	275	101	–	–	52	–	–	–		–	–	–	–	–	–	–	–	–	–	–		– Completed September 1853.
Swinburn & Son	Ditto	5,750	23 6	500	500	500	500	500	500	500	500	500	500	750		–	39	152	415	628	690	794	708	667	836	527		500	461	348	85	–	–	–	–	–	–	228		–	–	–	–	–	–	–	–	–	–	–		– Completed August 1853.
Tipping & Lawden	Ditto	5,750	23 6	500	500	500	500	500	500	500	500	500	500	750		–	42	291	381	368	580	483	611	714	768	743		500	458	209	119	132	–	17	–	–	–	7		–	–	–	–	–	–	–	–	–	–	–		– Thirteen required to complete the order.
Thomas Turner	Ditto	5,750	23 6	500	500	500	500	500	500	500	500	500	500	750		3	43	187	446	650	703	775	577	720	864	572		497	457	313	54	–	–	–	–	–	–	178		–	–	–	–	–	–	–	–	–	–	–		– Completed July 1853. (*The whole by* 23 *April* 1853.)

Memorandum.—The materials for setting up Muskets being all viewed previous to their being issued to the Contractors, no rejections can take place except in the case of any portion of the materials being made waste in working, and such portion is made good, at the expense of the Contractor, from materials issued to him, for that purpose, from the Ordnance Stores.

CARBINES, ARTILLERY, Rifled, ·577 Bore.

BARRELS.—TENDERS accepted by the Board's Order, dated 4 April 1853 (C—2,551).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Numbers Ordered.	Price.	Number agreed to be Delivered by					Number actually Delivered and Accepted by					Deficiencies on					Rejections up to					REMARKS.
				23 July 1853.	20 Aug. 1853.	17 Sept. 1853.	15 Oct. 1853.	12 Nov. 1853.	23 July 1853.	20 Aug. 1853.	17 Sept. 1853.	15 Oct. 1853.	12 Nov. 1853.	23 July 1853.	20 Aug. 1853.	17 Sept. 1853.	15 Oct. 1853.	12 Nov. 1853.	23 July 1853.	20 Aug. 1853.	17 Sept. 1853.	15 Oct. 1853.	12 Nov. 1853.	
			s. d.																					
Beasley & Farmer	Barrels, Carbine, Rifled for Royal Artillery.	286	10 6	57	57	57	57	58	59	103	64	32	4	– –	– –	– –	24	– –	45	62	35	46	25	– Supply completed in January 1854.
Clive, John		286	10 6	57	57	57	57	58	19	102	150	15	– –	38	– –	– –	– –	– –	56	78	149	30	–	
Clive, Henry		286	10 6	57	57	57	57	58	162	124	– –	– –	– –	– –	– –	– –	– –	– –	163	58	–	–	–	(*The whole by* 12 *November* 1853.)
Deakin & Son		285	10 6	57	57	57	57	57	102	160	23	– –	– –	– –	– –	– –	– –	– –	94	41	6	–	–	
Millward, E.		286	10 6	57	57	57	57	58	60	100	99	27	– –	– –	– –	– –	– –	– –	109	60	57	40	–	
Millward, W.		285	10 6	57	57	57	57	57	89	154	42	– –	– –	– –	– –	– –	– –	– –	113	49	4	–	–	
Turner, J., & Son		286	10 6	57	57	57	57	58	121	84	56	25	– –	– –	– –	– –	– –	– –	83	38	24	3	–	

LOCKS.—TENDERS accepted by the Board's Order, dated 4 April 1853 (C—2,551).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Numbers Ordered.	Price.	Number agreed to be Delivered by			Number actually Delivered and Accepted by			Deficiency on			Rejections up to			REMARKS.
				23 July 1853.	20 Aug. 1853.	17 Sept. 1853.	23 July 1853.	20 Aug. 1853.	17 Sept. 1853.	23 July 1853.	20 Aug. 1853.	17 Sept. 1853.	23 July 1853.	20 Aug. 1853.	17 Sept. 1853.	
			s. d.													
Aston, R. & W.	Locks, swivel	250	9 –	250	- -	- -	173	- -	- -	77	- -	- -	237	- -	- -	(*The whole by* 17 *Sept.* 1853.)
Corbett, W.	Ditto	1,000	8 2	400	400	200	465	324	211	- -	76	- -	233	86	- -	
Francis, J.	Ditto	250	9 –	250	- -	- -	143	- -	- -	107	- -	- -	126	- -	- -	
Partridge, J. & E.	Ditto	250	9 –	250	- -	- -	140	- -	- -	110	- -	- -	138	- -	- -	
Sanders, S.	Ditto	250	7 10	80	80	90	136	73	41	- -	7	- -	99	10	7	

BANDS, COCKS, RAMMERS, &c.—TENDERS accepted by the Board's Order, dated 4 April 1853 (C—2,551).

NAMES of CONTRACTORS.	DESCRIPTION of WORK.	Numbers Ordered.	Price.	Number agreed to be Delivered by 21 May 1853.	Number actually Delivered and Accepted by 21 May 1853.	Deficiencies on 21 May 1853.	Rejections to 21 May 1853.	REMARKS.
			s. d.					
Gilbert T. & C.	Rammers	2,000	1 4	2,000	- - -	2,000	- -	Supply not completed on 1 March 1854
	Cocks, stamped	2,000	– 2½	2,000	- - -	2,000	- -	Supply completed in October 1853 -
Aston, R. & W.	Bands, front	2,000	1 2	2,000	- - -	2,000	- -	- Ditto - - in February 1854 -
	Bands, back	2,000	– 10	2,000	- - -	2,000	- -	
	Swivels, butt	2,000	– 3	2,000	- - -	2,000	- -	- Ditto - - in February 1854 -
Grice, James	Triggers	2,000	– – ½	2,000	- - -	2,000	- -	- Ditto - - in October 1853 -
	Screws Large	4,000	2*s.* 5*d.* per 100	4,000	- - -	4,000	- -	- Ditto - - in October 1853 -
	Screws Small	6,000	1*s.* – ½*d.* „	6,000	- - -	6,000	- -	- Ditto - - in July 1853 - -
	Nails Breech	2,000	2*s.* 6*d.* „	2,000	- - -	2,000	- -	- Ditto - - in July 1853 - -
	Nails Side	4,000		4,000	- - -	4,000	- -	

(*The whole by* 21 *May* 1853.)

CARBINES, ARTILLERY, Rifled, ·577 Bore—*continued.*

SWORDS, BAYONET.—TENDERS accepted by the Board's Order, dated 13th April 1853 (R—1,504).

NAMES OF CONTRACTORS.	Description of Articles.	Number Ordered.	Price.	Number agreed to be Delivered by 4 August 1853.	Number actually Delivered and Accepted by 4 August 1853.	Deficiencies on 4 August 1853.	Rejections up to 4 August 1853.	REMARKS.
Reeves & Greaves	Swords, Bayonet	2,000	s. d. 22 6	2,000	-	2,000	-	Contract not completed on the 18th March 1854.—(*By* 4 *August* 1853).

SIGHTS, BACK, ELEVATING.—TENDERS accepted by the Board's Order, 22 April 1853 (A—2,898).

NAMES OF CONTRACTORS.	Description of Articles.	Number Ordered.	Price.	Number agreed to be Delivered by 15 July 1853.	Number actually Delivered and Accepted by 15 July 1853.	Deficiencies on 15 July 1853.	Rejections up to 15 July 1853.	REMARKS.
Aston, R. & W.	Sights, Elevating	2,000	s. d. 4 6	2,000	-	2,000	-	Supply completed in February 1854.—(*By* 15 *July* 1853).

BRASS WORK.—TENDER accepted by the Board's Order, dated 19 January 1853 (S—2,548).

NAMES OF CONTRACTORS.	Description of Articles.	Number Ordered.	Price.	Number agreed to be Delivered by 31 March 1853.	Numbers actually Delivered and Accepted by 31 March 1853.	Deficiency on 31 March 1853.	Rejections up to 31 March 1853.	REMARKS.
Hargrove, Samuel	Brass Work, Sets	2,000	3 *d.* per lb. re-cast.	2,000	-	2,000	-	Supply completed in April 1853.—(*By* 31 *March* 1853).

SETTING UP.—The Setting Up of these Carbines was distributed between the undermentioned Manufacturers, per Board's Order, dated the 5th October 1853 (E—782), but no time was specified for completing the Order, viz.:

Messrs. Hollis & Sheath	No. 500
„ Swinburn & Sons	„ 500
„ Tipping & Lawden	„ 500
„ T. Turner & Co.	„ 500
	2,000

Small Arms Office, Birmingham, 20 March 1854.

R. W. Gunner, Storekeeper.

Appendix, No. 4.

Appendix, No. 4.

REGULATIONS and INSTRUCTIONS for the VIEWERS under the Direction of the Inspector of Small Arms.

THE Master-general and Board of Ordnance, by their order, dated February 8th, 1841, $\frac{5}{1281}$, have been pleased to sanction the following Rates of Pay to the Permanent Viewers employed on the inspection of Small Arms in London, at Enfield, and at Birmingham; viz.

For the first seven years of service - - -	£. 110	per annum.
For the second ditto ditto - - -	120	ditto.
After fourteen years of service - - - -	130	ditto.

To be paid quarterly; and that they shall be deemed entitled, when no longer fit for duty, to the rates of pension prescribed by the General Regulations of the Department for length of service and good conduct.

The conditions attached to this grant are, that all Viewers on first coming into the service, shall serve one year on probation as Extra Viewer, unless they shall have been previously employed in the Royal Manufactory for three years as artificers; and if then finally confirmed, such year of service shall be reckoned into their first period of service as Permanent Viewers.

That all the Viewers in the service, at the date of the grant, or who may be appointed in future, shall enter into a written agreement not to work, or superintend work of any kind, for the private trade.

That all the Viewers shall be liable, at any time, to be removed from one station to another, whenever the convenience of the service may require such a change.

That the periodical increase of pay be in no case given without a certificate of the applicant's good conduct, and continued skill and diligence, to be signed by the proper officer under the Inspector of Small Arms, and countersigned by him; and that such certificate may be deferred or withheld entirely, if the Viewer's conduct shall not have been entirely satisfactory.

And further, that all Extra Viewers who may be employed from time to time, either on probation or to assist in any emergency, be allowed at the rate of 7 *s.* per day, and paid on the weekly pay lists in the usual manner.

Mr. William Evans,

IN communicating to you the terms of this very liberal grant, I must explain that the intention of the Master-general and Board has been to render the Viewers in Her Majesty's service free of all private connexion that would interfere with their duty; to give them an interest in the public service; and to induce a feeling of self-respect, integrity and independence, which must be alike beneficial to themselves and to the public.

In the exercise of your duty you must be perfectly impartial; no relative or friend is to be favoured, and no feeling of grudge or ill-will against master or man must be admitted, when deciding upon the work that passes through your hands. Look first to the public service, and, that secured, then exercise your view with temper and discretion.

No presents or offerings of any kind are to be accepted from either contractors or workmen employed by them, whether in the name of Christmas-boxes, or under any other pretence whatever; and any Viewer accepting presents from those persons will be liable to instant discharge.

You will do well not to join yourself with political societies, or with any Trades Union either of masters or men; any connexion with the last-mentioned would at once render you unfit for your situation.

It is needless, I trust, to point out to you that habits of intemperance will equally unfit you for your duties. If these are ever observed, you would expose yourself to inevitable discharge, whatever your previous length of service may have been.

Be regular and punctual in attendance upon your duty, recollecting that you are exonerated from call, because confidence is placed in you that the indulgence will not be abused.

Appendix, No. 4.

And to conclude, by way of advice, let me remind you that no man can be free or independent who is not careful in the management of his private affairs, nor can any one possess feelings of self-respect if he gives way to immoral or intemperate habits.

Geo. Lovell,
Inspector of Small Arms.

Small Arm Office, Birmingham,
7 April 1841.

Course of Inspection and Proof for Jags for Rifle Muskets.

The brass of the Jag will be inspected by gauging, to see that it is the same diameter and has an equal number of threads to the pattern, and that the slot-hole through is of the requisite size; the hole in the shank will be tried by a screw-tap to see that the thread of the screw is of the requisite size and depth; and the whole Jag will be tried by fixing and wrenching in a vice occasionally, to see that the brass is soundly cast on.

Frans. Geo. Lovell,
Assistant Inspector of Small Arms.

15 July 1852.

Course of Inspection for Artillery Musket Rammers.

The Rammers will be inspected by gauging, first, over the head; second, three inches under it; third, in the middle; and, fourth, at the point. They must be ground, polished, and finished equal to the pattern. They will be proved by striking the head over a block, and by springing, pressing down the head to a distance of 27 inches from the point, which curvature they must stand without breaking or setting. The thread of the screw will be tested by the master screw-plate.

22 July 1852. *Frans. Geo. Lovell.*

Course of Inspection and Proof of Barrels in the Filed State, for Artillery Rifle Carbines, ·577 Bore.

The Barrels will be examined by a plug of ·575, which must pass; the rejecting plug is ·577. See that the bore is straight from end to end; exterior well struck up; the iron equally thick all round; the sight and bar to be tested by a smart blow, and to be gauged to prove that they are truly placed. The barrel, before percussioning, to be proved with seven drachms of small-arm powder and an elongated service-ball, with a cork wad over the ball.

Geo. Lovell,
Inspector of Small Arms.

Course of Inspection and Proof.

The Bayonet will be examined by the plug, and must fit exact; they will be struck on a stake at the bend of the neck, and struck with a hammer on each side of the projecting rim, and the blade bent over a block in the usual manner; the blade will be gauged in three places, and examined to see that the grinding and polishing has been properly executed.

12 March 1852. *William Evans.*

Course of Inspection and Proof.

The Swords will be subjected to proof by striking back and edge on an oaken block in the usual manner. The blades of the staff-sergeants' and sergeants' swords to spring both ways three inches, and the drummers' two-and-a-half inches in the length of the blade.

	ft.	in.
Serjeants' length - - - - -	2	8½
Drummers' length - - - - -	2	5½

5 April 1852. *William Evans.*

Course of Inspection and Test for Nipple Wrenches.

The Nipple Wrenches will be inspected by easy jeg and gauge, and the nipple wing tested by a strong hand, wearing a glove. The square will be closely examined, and the screw tested by a plate, and the material will be tested by breaking occasionally. If it be found of inferior quality, the whole of that supply will be rejected.

September 1852. *W. Evans.*

Course of Inspection and Proof of Mainspring Cramps.

The Cramps to be viewed by easy jeg and gauge; the thread of the screws and nut tried by taps, and the whole carefully examined to see that the work be equally as well finished as the pattern in every respect; and parts will be broken occasionally to see that the material they are made of be of proper quality.

September 1852. *W. Evans.*

Course of Inspection and Proof for Service Nipples.

The Nipples will be inspected by accurate steel guages, and no deviation whatever from the pattern to be admitted.

The quality of the steel to be ascertained by breaking occasionally, and the Nipples to be tested by a trial of ten per cent., undergoing twenty-five blows with a try-cock moved by a spring of sixteen pounds; if any of these break or are battered in the trial, the whole of that supply to be rejected.

September 1852. *W. Evans.*

Course of Inspection for Sea Service and Coast Guard Pistol Lock.

The Lock to be viewed by jeg and gauge close at all points, the round axle the tumbler to be truly cylindrical, exact to the pattern gauge, the pins to be of one size, thread to be tried occasionally by the master screw-plate; the Locks to be stripped to see that the work is put together square, and is well fitted according to the quality of the Lock required.

7 March 1853. *W. Evans.*

Course of Examination and Proof of Elevating Sights for New Rifle Muskets, ·577 Bore.

The Sights will be examined by close gauge at every part to see that they are filed square, and jointed square and upright, and that the joints work firmly and smoothly; the elevator to be tested by pressure laterally, to see that it has the proper degree of elasticity, and that the slider works freely and smoothly from end to end.

2 May 1853. *W. Evans.*

Specification for Bayonets with Locking Rings for Rifle Muskets, Pattern 1853.

The blade and the neck also to be entirely of steel, either the best shear or mild cast steel; soundly welded to the socket, which is to be forged of the best clear iron, with a base to support the locking ring, the whole to be free from greys or flaws; the socket itself and base for locking ring to be neatly and accurately turned in a slide lathe. The whole bayonet to be ground, polished, and filed up in a workmanlike manner, equal to the pattern in every respect, and to weigh, when finished, from 11 to 12 ounces.

Course of Inspection and Proof.

The Bayonets will be examined by the plug, and must fit exactly; they will be struck on a stake at the bend of the neck, the blade bent over a block in the usual manner, the locking ring will be closely inspected to see that it is neatly and accurately adjusted to its base, and to the socket, so as to act smoothly, and without friction. The blade will be gauged in three places, and examined to see that the grinding and polishing has been properly executed.

14 November 1853. *W. Evans.*

Memorandum of the Course of Examination and Inspection of the Sighting of the New Pattern Artillery Rifle Carbines.

The barrels to be received in the view-rooms in the rifled state. The Back Sight to be first examined as to its being square with the breech-pin, and the top of the leaves and block reduced to their proper heights (after which the barrels to be proved and viewed for rifling and sighting in the usual way), and then the notches to be cut in the machine-room,

Appendix, No. 4.

and to be examined in the view-room by a sighting bar. The Sights will finally be looked at by the Finishing Viewer, to ascertain that they are correct in the stocks. The gauges in the first view will be a double square, and a graduating gauge with three elevations.

Small Arms Office,
Birmingham, 11 January 1854.

W. Evans.

Course of Inspection for Jags.

The brass of the Jag will be inspected by gauging, to see that it is the same diameter and has an equal number of threads to the pattern, and that the slot hole through is of the requisite size; the hole in the shank will be tried by a screw tap to see that the thread of the screw is of the requisite size and depth, and the whole Jag will be tried by fixing and wrenching in a vice occasionally to see that the brass is soundly cast on.

W. Evans.

Course of Inspection for Ball Drawers.

The Ball Drawers will be inspected by close gauging, to see that they are exact to the pattern at all points, and the thread in the base will be tested by a screw-tap put down to see that it is correct.

The horns will be broken off occasionally, to ascertain they are properly tempered and made of the proper description of steel.

W. Evans.

Course of Inspection and Proof.

The Bayonets will be examined by the plug, and must fit exact; they will be struck on a stake at the bend of the neck, and struck with a hammer on each side of the projecting rim, and the blade bent over a block in the usual manner; the blade will be gauged in three places, and examined to see that the grinding and polishing has been properly executed.

W. Evans.

Course of Inspection and Proof.

The Bands to be received by close gauge, and to fit the mandrils accurately. The screws to be tried by the screw plate, and the bands and swivels to be broken occasionally to test the quality of the materials.

W. Evans.

Course of Inspection and Proof for Bayonet Springs for Sea-service Muskets.

The Springs to be inspected by jeg and gauge, and proved by bending back not exceeding ($\frac{3}{8}$) three-eighths of an inch, which they must stand without breaking or setting, otherwise to be rejected.

W. Evans.

Course of Inspection and Proof of Swivel Locks for Artillery Rifle Carbines, ·577 Bore.

The Locks to be viewed by jeg and gauge, to be stripped, to see that all the parts are well fitted, and that the main spring and swivel work clear, free and square; that all the parts and pins are jointed together square and firm, and that the workmanship of the Lock throughout is according to the quality required, and quite equal to the pattern in every respect.

W. Evans.

SPECIFICATION for BARRELS in the filed state for RIFLE MUSKETS, Pattern of 1853, ·577 Bore.

THE Barrels to be rolled of the best charcoal iron, and the lumps forged of the same, without steely or hard parts to obstruct the rifling; to be free from greys or flaws from end to end; no wires to be admitted, and if any be afterwards found, the whole expense incurred in setting up to be charged against the barrel-masters; to be turned true, and bored straight, exactly to the dimensions of the pattern; to be struck up clean, in a workmanlike manner; the breech-pin to be cylindrical, clean screwed, and not to shake on the second thread; the sight to be brazed on with the best pin brass, and to range exactly with the surface of the nipple-lump. All Barrels found faulty and unsound in percussioning, to be exchanged by the contractor.

COURSE of Inspection and Proof.

THE Barrels will be examined by a plug of ·572, which must pass; the rejecting plug is ·577. See that the bore is straight from end to end; exterior well struck up; the iron equally thick all round; the sight to be tested by a smart blow, and to be gauged, to prove that it is truly placed; the Barrel before percussioning to be proved with seven drachms of small-arm powder, and an elongated service-ball, with a cork wad over the ball.

J. A. Pellatt,
7 January 1854. for the Inspector of Small Arms.

COURSE of Inspection for BALL DRAWERS for RIFLE MUSKETS.

THE Ball Drawers will be inspected by close gauging to see that they are exact to the pattern at all points, and the thread in the base will be tested by a screw tap put down to see that it is correct. The horns will be broken off occasionally, to ascertain they are properly tempered and made of the proper description of steel.

COURSE of Inspection for NIPPLE WRENCHES for RIFLE MUSKETS.

THE Nipple Wrenches will be inspected by easy jeg and gauge, and the nipple wing tested by a strong hand, wearing a glove; the square will be closely examined, and the screw tested by a plate, and the material will be tested by breaking occasionally; if it be found of inferior quality, the whole of that supply will be rejected.

COURSE of Inspection for MAINSPRING CRAMPS for RIFLE MUSKETS.

THE Cramps to be viewed by easy jeg and gauge, the threads of the screws and nuts tried by taps, and the whole carefully examined to see that the work be equally as well finished as the pattern in every respect; and parts will be broken occasionally, to see that the material of which they are made is of proper quality.

No. 43.

SPECIFICATIONS and RULES to be attended to in the Weekly Supply and Delivery of BAYONET SWORDS and SCABBARDS for ARTILLERY RIFLE CARBINES, 577 bore, and in the Inspection of the same under the General Conditions of Contract, to be annexed hereto and form part hereof.

THE number of Bayonet Swords agreed for are to be delivered on a fixed day or days in every week regularly, through the whole continuance of the contract; but no more than the number agreed for are to be passed in any one week, and to ensure regularity in the weekly deliveries, the contractor to be liable to a fine of one shilling for every sword and scabbard passed view that shall be short of the number agreed for, which fine is to be deducted from his monthly account.

The sword blades are to be forged of cast steel with iron tangs shut on below the shoulder, accurately ground and polished; the cross guards of the best wrought iron, filed and burnished; the grips of good clean bright-coloured brass, sound, and free from honeycombs;

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the mountings, catch-spring, pins, &c., well and neatly fitted, equal to the pattern in every respect.

The scabbards to be of sheet steel, with spudgeons neatly brazed and fitted, well polished, and to weigh, finished, from 13½ to 14½ ounces.

Course of Inspection and Proof.

The blades to be gauged at the shoulders and 12 inches from the same, and to drop into a trough; to be proved by springing 3½ inches over a bridge of 1½ inch high, placed at 10 inches from the point. The grip to fit on to a mandril, so that the hole in the cross-guard shall correspond exactly with the groove in the back. The sword bayonet, when mounted, to drop into a trough, and to weigh from 1 lb. 10½ oz. to 1 lb. 11½ oz.

Appendix, No. 5.

Appendix, No. 5.

Colonel *Chalmer*, R. A., to the Secretary to the Honourable Board, reporting upon Colonel *Colt*'s Revolving Pistols.

Sir, Royal Arsenal, Woolwich, 28 March 1854.

I have the honour to report, for the information of the Honourable Board, that three of Colonel Colt's revolving pistols sent to me for trial, have undergone the following tests; viz.

No. 1. Large size pistol, 400 rounds.

No. 2. Second size pistol, 400 rounds.

No. 3. Also second size, 150 rounds.

The whole of these pistols have made good shooting at ranges of 50, 75, and 100 yards; but the accuracy of aim is, of course, dependent on the skill of the person who uses them.

Nos. 1 and 2 were carried in a holster by mounted N. C. officers for an hour and a quarter, trotting and walking alternately, in order to try if the bullets were secure in the chambers. They were in no way displaced, though one of the pistols exploded in the holster (slightly injuring the leg of the N. C. officer). This was occasioned by the pistol lifting up and down, there being no flounce to the holsters, to confine the pistol securely in its position.

It is necessary, in order to secure the chambers revolving freely, that the caps should fit the nipples very accurately.

I have not had the advantage of the assistance of the Sub-committee on Small Arms upon these trials, as the officers are dispersed on foreign service; but Lieutenants Warlow and L'Estrange, R. A., have constantly attended.

It is our opinion, upon the whole, that Colonel Colt's revolving pistols are good, effective, substantial, and serviceable arms, and with moderate care and attention would answer all the exigencies of service.

I have, &c.

Joseph Wood, Esq.
&c. &c. &c.

(signed) *J. A. Chalmer*, Colonel, R. A.

Appendix, No. 6.

RETURN of the Number of ARMS contracted for in each of the last Ten Years, and of the Number of ARMS accepted by the ORDNANCE in each of the last Ten Years from *London* and *Birmingham* respectively.

	Date of Contract for Materials.	Date of Contract for Setting-up.	Number contracted for.	Number Accepted for the Ordnance.
LONDON, 1844.				
Carbines, percussion — Constabulary	17 June 1842 17 Nov. 1843	17 June 1842 17 Nov. 1843	- -	1,007
Carbines, percussion — Victoria	11 Nov. 1840	11 Nov. 1840	- -	33
Carbines, percussion — Yeomanry (completed in 1845)	15 Mar. 1844 27 Sept. 1843 29 July 1844	15 Mar. 1844 22 – – 29 July –	4,000	3,053
Muskets — Flint, Coastguard	13 Mar. –	13 Mar. –	1,000	1,000
Muskets — Percussion — Artillery	25 Jan. 1843	25 Jan. 1843	- -	1,181
Muskets — Percussion — ditto (supplied in 1845)	28 June 1844	28 June 1844	1,564	—
Muskets — Percussion — Serjeants	8 Apr. 1840 17 May 1841 24 Apr. 1843	22 June 1840 17 May 1841 24 Apr. 1843	- -	943
Muskets — Percussion — New line	6 May 1842 28 June 1843	6 May 1842 28 June 1843	- -	2,302
Muskets — Percussion — ditto (supplied in 1845)	13 May 1844	20 Dec. 1844	4,000	—
Muskets — Percussion — Sappers (ditto in 1847)	21 June –	21 June –	185	—
Muskets — Percussion — Sea service	8 Nov. 1841 14 Oct. 1842	8 Nov. 1841 14 Oct. 1842	- -	36
Muskets — Percussion — Altered from flint locks	18 Mar. –	18 Mar. –	- -	4
Pistols, percussion, sea service	19 Aug. 1839 28 Apr. 1843	19 Aug. 1839 28 Apr. 1843	- -	1,838
Ditto - ditto - Cavalry	2 Dec. 1842	21 – –	- -	101
Rifles, Brunswick	11 Aug. 1843	11 Aug. –	- -	1,041
		TOTAL	10,749	12,539
LONDON, 1845.				
Carbines, percussion — Victoria	11 Nov. 1840	17 Nov. 1841	- -	27
Carbines, percussion — Yeomanry	15 Mar. 1844 29 July –	15 Mar. 1844 29 July –	- -	947
Muskets, percussion — Artillery	28 June – 25 Jan. 1843	28 June – 25 Jan. 1843	- -	1,565
Muskets, percussion — New line	13 May 1844 6 May 1842 28 June 1843 24 Nov. –	20 Dec. 1844 6 May 1842 28 June 1843 24 Nov. –	- -	8,052
Muskets, percussion — Ditto (supplied in 1846–7–8)	13 June 1845 26 Nov. –	13 June 1845 26 Nov. –	14,000	1,000
Muskets, percussion — Extra service (supplied in 1846)	12 Nov. –	12 – –	8,000	—
Muskets, percussion — Altered from flint locks	17 May 1841 18 Mar. 1842	17 May 1841 18 Mar. 1842	- -	116
Muskets, percussion — Serjeants	17 May 1841 24 Apr. 1843	17 May 1841 24 Apr. 1843	- -	30
Pistols, percussion — Sea service	19 Aug. 1839 28 Apr. 1843	19 Aug. 1839 28 Apr. 1843	- -	282
Pistols, percussion — Ditto (supplied in 1846 and 1847)	18 Aug. 1845	18 Aug. 1845	5,000	—
Rifles, Brunswick (supplied in 1846–7–8)	24 Nov. 1845	24 Nov. –	4,000	—
		TOTAL	31,000	12,019

		Date of Contract for Materials.	Date of Contract for Setting-up.	Number contracted for.	Number Accepted for the Ordnance.
	London, 1846.				
Carbines, percussion	Victoria	11 Nov. 1840	17 Sept. 1841	- -	16
	Constabulary (supplied in 1847)	20 April 1846 4 May –	20 Apr. 1846 4 May –	2,000	—
Muskets, percussion	Sea service	8 Nov. 1841 14 Oct. 1842	8 Nov. 1841 14 Oct. 1842	- -	30
	Altered from flint	18 Mar. 1842	18 Mar. –	- -	11
	Artillery	25 Jan. 1843	25 Jan. 1843	- -	4
	Serjeant's line	24 April –	24 Apr. –	- -	82
	New line	28 June – 13 June 1845 26 Nov. 1845	28 June – 13 June 1845 26 Nov. –	- -	6,139
	Extra service	12 – –	12 – –	- -	8,000
	- ditto	1 April 1846	1 Apr. 1846	957	957
	Artillery and Sappers (completed in 1847.)	8 – –	8 – –	1,835	14
	New line (supplied in 1848-49)	6 May –	6 May –	8,000	—
Pistols, percussion, sea service		28 April 1843 18 Aug. 1845	28 Apr. 1843 18 Aug. 1845	- -	4,415
Rifles, Brunswick		24 Nov. –	24 Nov. –	- -	191
			Total	12,792	19,859
	London, 1847.				
Carbines, percussion	Constabulary	20 Apr. 1846 4 May –	20 Apr. 1846 4 May –	- -	2,000
	- ditto	15 Jan. 1847	15 Jan. 1847	2,000	2,000
	- ditto (completed in 1848)	15 – –	15 – –	600	515
	For Australia (completed in 1848)	16 Apr. –	16 Apr. –	110	64
Muskets, percussion	Sappers	21 June 1844	21 June 1844	- -	185
	New line	26 Nov. 1845	26 Nov. 1845	- -	4,653
	Artillery	8 Apr. 1846	8 Apr. 1846	- -	1,821
	ditto	26 Feb. 1847	26 Feb. 1847	1,200	1,200
	Serjeant's (supplied in 1848)	28 July –	28 July –	2,000	—
	Extra service (supplied in 1848 and 1849.)	8 Dec. –	8 Dec. –	15,000	—
Pistols, percussion	Sea service	18 Aug. 1845	18 Aug. 1845	- -	683
	- ditto (supplied in 1849 and 1850)	28 July 1847	28 July 1847	5,000	—
Rifles, Brunswick		24 Nov. 1845	24 Nov. 1845	- -	3,620
Pistols, percussion, Cavalry		2 Dec. 1842	21 Apr. 1843	- -	427
			Total	25,910	17,168
	London, 1848.				
Carbines, percussion	Constabulary	15 Jan. 1847	15 Jan. 1847	- -	85
	For Australia	6 Apr. –	6 Apr. –	- -	46
Muskets, percussion	New line	26 Nov. 1845 6 May 1846	26 Nov. 1845 6 May 1846	- -	7,009
	Serjeant's line	28 July 1847	28 July 1847	- -	2,000
	Extra service	8 Dec. –	8 Dec. –	- -	11,744
	Artillery	4 Feb. 1848	4 Feb. 1848	2,000	2,000
	Sappers (completed in 1849)	23 – –	23 – –	500	210
	Extra service (completed in 1849)	15 May –	15 May –	3,000	725
	Extra service (supplied in 1849)	4 Sept. –	4 Sept. –	5,000	—
	New line (supplied in 1849)	4 – –	4 – –	4,000	—
Pistols, percussion, Cavalry		2 Dec. 1842	21 Apr. 1843	- -	47
Rifles, Brunswick		24 Nov. 1845	24 Nov. 1845	- -	189
			Total	14,500	24,055

	Date of Contract for Materials.	Date of Contract for Setting-up.	Number contracted for.	Number Accepted for the Ordnance.
London, 1849.				
Muskets, percussion — New line	6 May 1846 4 Sept. 1848	6 May 1846 4 Sept. 1848	- -	7,238
Muskets, percussion — Extra service	8 Dec. 1847 4 Sept. 1848	8 Dec. 1847 4 Sept. 1848	- -	8,256
Muskets, percussion — Sappers	23 Feb. –	23 Feb. –	- -	290
Muskets, percussion — Extra service	15 May –	15 May –	- -	2,275
Muskets, percussion — New line	22 May 1849	22 May 1849	2,500	2,500
Muskets, percussion — Ditto (completed in 1850)	21 Sept. –	21 Sept. –	5,000	1,430
Pistols, percussion, sea service	28 July 1847	28 July 1847	- -	4,819
		Total	7,500	26,808
London, 1850.				
Pistols, sea service	28 July 1847	28 July 1847	- -	181
Muskets, percussion — New line	21 Sept. 1849	21 Sept. 1849	- -	3,570
Muskets, percussion — Extra service (completed in 1851)	- - Materials from store	20 May 1850	18,094	10,372
		Total	18,094	14,123
London, 1851.				
Carbines, percussion, double-barrelled, for Cape Corps	29 May 1851	29 May 1851	350	242
Muskets - ditto - extra service	- - Materials from store	20 May 1850	- -	7,722
		Total	350	7,964
London, 1852.				
Carbines, double barrel, (Cape Corps)	29 May 1851	29 May 1851	- -	108
London, 1853.				
— Nil. —				
Birmingham, 1844.				
Carbines, percussion — Constabulary	17 Nov. 1843 21 Feb. 1844	17 Nov. 1843 21 Feb. 1844	1,500	3,500
Carbines, percussion — For Australia	1 July 1842 22 Dec. 1843	1 July 1842 22 Dec. 1843	- -	90
Carbines, percussion — Yeomanry (supply completed in 1845)	15 Mar. 1844 27 Sept. 1843 29 July 1844	15 Mar. 1844 22 – – 29 July –	6,000	5,751
Muskets — Flint, extra service	19 July 1843	19 July 1843	- -	10,627
Muskets — Percussion — Artillery (supplied in 1845)	28 June 1844	28 June 1844	2,000	—
Muskets — Percussion — New line	28 June 1843 24 Nov. –	28 June 1843 24 Nov. –	- -	2,742
Muskets — Percussion — Ditto (supplied in 1845)	13 May 1844	20 Dec. 1844	6,000	—
Muskets — Percussion — Sea service	14 Oct. 1842	14 Oct. 1842	- -	404
Muskets — Percussion — Serjeants	24 April 1843	24 April 1843	- -	1,000
Muskets — Percussion — Sappers (supplied in 1846)	21 June 1844	21 June 1844	135	—
Muskets — Percussion — Extra service (supplied in 1845-6)	16 Oct. –	16 Oct. –	20,000	—
Muskets — Percussion — Presents for Indian Chiefs	26 Jan. –	26 Jan. 1844	11	11
Muskets — Percussion — Ditto (supplied in 1845)	4 Sept. –	4 Sept. –	100	—
Pistols, percussion — Australia	1 July 1842	1 July 1842	- -	449
Pistols, percussion — Cavalry	2 Dec. –	21 April 1843	- -	17
Pistols, percussion — Sea service	28 April 1843	28 – –	- -	2,252
		Total	35,746	26,843

	Date of Contract for Materials.	Date of Contract for Setting-up.	Number contracted for.	Number Accepted for the Ordnance.
BIRMINGHAM, 1845.				
Carbines, percussion — Constabulary (supplied in 1846)	18 Aug. 1845	18 Aug. 1845	100	—
Carbines, percussion — Yeomanry	29 July 1844	29 July 1844	-	249
Carbines, percussion — Ditto (supplied in 1847 and 1848)	26 Feb. 1845	26 Feb. 1845	6,000	—
Carbines, percussion — Double-barrelled, constabulary	19 – –	19 – –	20	20
Muskets, percussion — Artillery	28 June 1844	28 June 1844	-	2,000
Muskets, percussion — Extra service	16 Oct. –	16 Oct. –	-	11,950
Muskets, percussion — New line	24 Nov. 1843 / 13 May 1844	24 Nov. 1843 / 20 Dec. 1844	-	10,173
Muskets, percussion — Ditto (supplied in 1846, 1847, and 1848)	13 June 1845	13 June 1845	6,000	—
Muskets, percussion — Sea service (supplied in 1846)	8 Dec. –	8 Dec. –	5,000	—
Muskets, percussion — Presents for Indian chiefs	4 Sept. 1844	4 Sept. 1844	-	100
Pistols, percussion — Australia (supplied in 1846)	18 Aug. 1845	18 Aug. 1845	200	—
Pistols, percussion — Cavalry	2 Dec. 1842	21 April 1843	-	936
		TOTAL	17,320	25,428
BIRMINGHAM, 1846.				
Carbines, percussion — For Australia	18 Aug. 1845	18 Aug. 1845	-	100
Carbines, percussion — Ditto (supplied in 1847)	9 Nov. 1846	9 Nov. 1846	133	—
Muskets, percussion — Sappers	21 June 1844	21 June 1844	-	135
Muskets, percussion — Extra service	12 Nov. 1845	12 Nov. 1845	-	12,000
Muskets, percussion — New line	13 June –	13 June –	-	2,000
Muskets, percussion — Sea service	8 Dec. –	8 Dec. –	-	5,000
Muskets, percussion — Extra service (completed in 1847)	1 April 1846	1 April 1846	19,143	6,290
Muskets, percussion — Artillery and Sappers (ditto)	8 – –	8 – –	265	204
Muskets, percussion — Sea service (supplied in 1847)	31 Dec. –	31 Dec. –	10,000	—
Muskets, percussion — New line (ditto in 1848)	6 May –	6 May –	2,000	—
Pistols, percussion — Cavalry	2 Dec. 1842	21 April 1843	-	64
Pistols, percussion — For Australia	18 Aug. 1845	18 Aug. 1845	-	200
Pistols, percussion — Ditto (supplied in 1847)	9 Nov. 1846	9 Nov. 1846	266	—
		TOTAL	31,807	25,993
BIRMINGHAM, 1847.				
Carbines, percussion — Yeomanry	26 Feb. 1845	26 Feb. 1845	-	4,746
Carbines, percussion — For Australia	9 Nov. 1846	9 Nov. 1846	-	133
Carbines, percussion — Double-barrelled (completed in 1848)	14 April 1847	14 April 1847	600	485
Muskets, percussion — New line	13 June 1845	13 June 1845	-	540
Muskets, percussion — Extra service	1 April 1846	1 April 1846	-	12,853
Muskets, percussion — Artillery and Sappers	8 – –	8 – –	-	61
Muskets, percussion — Sea service	31 Dec. –	31 Dec. –	-	10,000
Muskets, percussion — Extra service (supplied in 1848)	8 – 1847	8 – 1847	25,000	—
Pistols, percussion, for Australia	9 Nov. 1846	9 Nov. 1846	-	266
		TOTAL	25,600	29,084
BIRMINGHAM, 1848.				
Carbines, percussion — Yeomanry	26 Feb. 1845	26 Feb. 1845	-	1,254
Carbines, percussion — Double-barrelled, for Cape Corps	14 April 1847	14 April 1847	-	115
Muskets, percussion — New line	13 June 1845	13 June 1845	-	3,460
Muskets, percussion — Extra service	8 Dec. 1847	8 Dec. 1847	-	25,000
Muskets, percussion — New line (supplied in 1849)	4 Sept. 1848	4 Sept. 1848	6,000	—
Muskets, percussion — Extra service (completed 1849)	4 – –	4 – –	15,000	5,063
Pistols, percussion (pocket), Constabulary	24 Jan. 1848	24 Jan. 1848	500	500
		TOTAL	21,500	35,392
BIRMINGHAM, 1849.				
Muskets, percussion — New line	6 May 1846 / 4 Sept. 1848	6 May 1846 / 4 Sept. 1848	-	8,000
Muskets, percussion — Extra service	4 – –	4 – –	-	9,937
Muskets, percussion — New line	22 May 1849	22 May 1849	5,000	5,000
Muskets, percussion — Extra service	22 – –	22 – –	2,500	2,500
Muskets, percussion — New line (completed 1850)	21 Sept. –	21 Sept. –	5,000	769
		TOTAL	12,500	26,206

	Date of Contract for Materials.	Date of Contract for Setting-up.	Number contracted for.	Number Accepted for the Ordnance.
BIRMINGHAM, 1850.				
Carbines, percussion, Constabulary (completed 1851)	Materials from store	20 Sept. 1850	500	175
Muskets, percussion — New line	21 Sept. 1849	21 Sept. 1849	—	4,231
Muskets, percussion — Sea service	Materials from store	25 May 1850	7,500	7,500
Muskets, percussion — Extra service (completed 1851)	ditto	25 — —	22,500	9,929
		TOTAL	30,500	21,835
BIRMINGHAM, 1851.				
Carbines, percussion — Constabulary	Materials from store	20 Sept. 1850	—	325
Carbines, percussion — ditto (supplied in 1852)	ditto	26 Sept. 1851	700	—
Muskets, ditto, extra service	ditto	25 May 1850	—	12,571
Pistols ditto, pocket (Constabulary) (supplied in 1852)	6 Oct. 1851	6 Oct. 1851	100	—
		TOTAL	800	12,896
BIRMINGHAM, 1852.				
Carbines, percussion, Constabulary	Materials from store	26 Sept. 1851	—	698
Muskets, percussion — Artillery	ditto	5 July 1852	500	500
Muskets, percussion — Extra service (supplied 1853)	4 Nov. 1852 8 — —	5 Nov. —	10,000	—
Muskets, percussion — Sea service (ditto)	4 — — 8 — —	5 — —	4,000	—
Muskets, percussion — Rifled, pattern 1851	6 & 24 June 1851 5 Jan. 1852 7 Feb. —	4 Feb. 1852	23,000*	11,133
Pistols, percussion (pocket), Constabulary	6 Oct. 1851	6 Oct. 1851	—	100
		TOTAL	37,500	12,431
BIRMINGHAM, 1853.				
Carbines, percussion — Constabulary	31 Jan. 1853 20 Apr. — 16 May —	15 Aug. 1853 13 Oct. —	1,200	627
Carbines, percussion — Artillery, N. P. rifled	19 Jan. — — 4, 13, and 22 April 1853	5 — —	2,000	—
Carbines, percussion — Double barrel	16 & 27 May 1853 1 June — 10 Aug. —	13 — —	550	8
Carbines, percussion — ditto with swords for Australia	3 & 10 Aug. — 29 July —	13 — —	50	—
Carbines, percussion — ditto rifled and sighted	20 April — 16 & 27 May — 1 June —	13 — —	50	—
Muskets, percussion — Rifled pattern 1851	6 & 24 June 1851 5 Jan. 1852 7 Feb. —	4 Feb. 1852	—	11,846
Muskets, percussion — Extra service	4 Nov. — 8 — —	5 Nov. —	—	9,945
Muskets, percussion — Sea service	4 — — 8 — —	5 — —	—	3,991
Pistols, percussion — Constabulary	14 Jan. 1853 31 — —	15 Aug. 1853	800	800
Pistols, percussion — Sea service	11 May — 1 June — 29 July —	13 Oct. —	3,000	—
Pistols, percussion — Carbine bore	16 & 27 May — 10 & 27 June — 25 July —	13 — —	930	363
		TOTAL	8,580	27,580

* Should have been completed by 30th April 1853, and is not completed this day.

Office of Ordnance, Birmingham, 25 March 1854.

R. W. Gunner,
Inspector of Small Arms.

Appendix, No. 7.

Appendix, No. 7.

MEMORANDUM by *S. Roper*, Esq., Chief Clerk.

Agreements with the gun manufacturers, whether for materials for small arms, or for setting them up, always specify the periodical rate at which they are to be delivered into store, and the orders completed.

These rates of delivery are either named by the Board, and assented to by the contractors, or by the latter being called on to name the time in which they will undertake to make the supply.

The fact, however, is, that these engagements as to time are frequently violated. Of late they have been much disarranged by disputes between the masters and workmen.

As an example, 23,000 rifled muskets, of the pattern of 1851, ordered to be set up by Board's order, 4 February 1852 (S—2731). Six parties undertook the supply, and agreed to deliver them at the rate of 100 per week from the delivery of the materials. The order should therefore have been completed by February 1853 : it was, however, not finished till at least six months afterwards.

Store Account Office,
27 February 1854.

Sam. Roper,
Chief Clerk.

Appendix, No. 8.

Appendix, No. 8.

RETURN, showing the Number of Rifled Muskets, 1851 Pattern, which have Burst since their Introduction into the Service Two Years ago.

REGIMENTS, &c.	Date of Bursting.	Muskets Rifled, 1851 Pattern.
Depôt, 13th Regiment	August 1853	1
„ 14th Regiment	July 1853	2
„ 23d Regiment	September 1853	1
„ 65th Regiment	August 1853	1
„ 79th Regiment	March 1854	1
„ 88th Regiment	September 1853	2
„ 97th Regiment	July 1853	1
	Total	9

Number of Rifled Muskets, 1851 Pattern, issued to the Army up to 18th March 1854 - 17,739

Store Account Office, Office of Ordnance,
31 March 1854.

Sam. Roper.

Appendix, No. 9.

PAPER delivered in by Colonel *J. G. Bonner*, 31 March 1854.

RETURN of PERCUSSION ARMS shipped to *India* from their First Adoption in 1840 to 1852–53.

	Muskets.	Fusils.	Rifles.	CARBINES.			PISTOLS.		Wall-Pieces.	Musketoons.	TOTAL.
				Victoria.	Light Cavalry.	Sappers.	Cavalry.	Sea Service.			
Season 1840–41 -	12,000	1,760	900	- -	900	- -	860	- -	20	- -	16,440
„ 1841–42 -	19,500	10,500	500	50	1,000	- -	1,200	- -	240	80	33,070
„ 1842–43 -	25,200	5,920	2,400	- -	- -	- -	- -	300	150	- -	33,970
„ 1843–44 -	14,600	6,060	2,050	1,800	- -	1,300	3,600	- -	200	- -	29,610
„ 1844–45 -	28,500	9,680	4,800	800	- -	700	4,400	- -	- -	- -	48,880
„ 1845–46 -	37,000	7,420	1,000	3,020	- -	2,150	2,400	- -	- -	- -	52,990
„ 1846–47 -	34,100	13,598	500	- -	200	1,625	4,100	630	- -	- -	54,753
„ 1847–48 -	58,180	2,176	- -	900	350	1,200	800	200	40	- -	63,846
„ 1848–49 -	47,000	3,326	445	- -	- -	- -	- -	100	- -	- -	50,871
„ 1849–50 -	27,500	1,000	1,200	- -	- -	- -	2,000	- -	20	- -	31,720
„ 1850–51 -	12,280	- -	250	- -	- -	2,720	- -	- -	- -	- -	15,250
„ 1851–52 -	8,000	1,574	- -	100	420	- -	- -	120	29	- -	10,243
„ 1852–53 -	5,480	- -	- -	300	4,000	1,000	- -	- -	500	- -	11,280
TOTAL - - -	329,340	63,014	14,045	6,970	6,870	10,695	19,360	1,350	1,199	80	452,923

Jno. Geo. Bonner,
Colonel and Inspector.

Appendix, No. 10.

(S—3595.)

Small Arms Office, Birmingham, 23 February 1854.

STATEMENT showing the WORK Performed and Inspected by the SMALL ARM DEPARTMENT at *Birmingham*, during the Year from 1 January to 31 December 1853; per Board's Order, 22 February 1854 (O—106), viz.:

Muskets set-up complete	Rifle, pattern of 1851		11,846
	Plain	Extra service	9,945
		Sea service	3,991
Carbines, set-up complete	Constabulary		627
	Double barrelled		8
Pistols, set-up complete	Six-inch		1,163
	Pocket		50
Barrels	Rifle musket	Pattern of 1851	100
		Pattern of 1853	467
	N. P. Rifle Carbine, Artillery		1,983
	Carbine	Constabulary	568
		Double, pairs	581
	Pistol	Carbine bore	1,730
		Sea service	2,995
Locks	New Rifle musket, pattern of 1853		583
	Carbine double, pairs		631
	N. P. Rifle Carbine		2,000
	Pistol	Carbine bore	1,730
		Sea service	2,896
Bayonets			3,529
Rammers			5,266
Materials, and small iron-work sets	Carbine	Constabulary	1,200
		Double	600
	New Rifle Musket		1,000
	Pistol Carbine bore		1,730
Brasswork, Constabulary Carbine, sets			1,200
Brasswork, sets	Carbines, double		650
	N. P. Rifle Carbine		2,000
	Rifle Musket, pattern 1853		3,500
	Pistol	Carbine bore	1,730
		Sea service	3,000

Articles not in complete Sets:

Bands, front, with swivels, N. P. Rifle Carbine			1,764
Bands, back	ditto		1,521
Cocks, stamped	ditto		2,000
Nails, breech	ditto		2,000
Nails, side	ditto		4,000
Screws, large	ditto		4,000
Screws, small	ditto		6,000
Swivels, butt	ditto		1,920
Triggers	ditto		2,000
Sights, back	ditto		1,977
Rings, swivel butt, sea service pistol			2,611
Ribs, side	ditto		1,101
Springs, rammer	ditto		2,826
Nails, breech	sea service pistol		3,000
Nails, side	ditto		3,000
Screws, No. 3	ditto		6,000
Screws, No. 4	ditto		1,000
Screws, No. 5	ditto		765
Triggers	ditto		2,864
Bands, front, new rifle musket			1,918
Bands, middle	ditto		2,054
Bands, back	ditto		583
Nails, breech	ditto		9,000
Nails, side	ditto		18,000
Screws, large	ditto		9,750
Screws, small	ditto		14,500
Triggers	ditto		6,392
Barrels jigged and lumps filed up	Rifle Musket, pattern 1851		627
	Carbine, constabulary		48
	Pistols, 6-inch		1,613
	N. P. Rifle Carbine		651
Ball-drawers, Brunswick Rifle			3,099
Blades, Fencing Foil			136
Cramps, Lock			619
Foils, Fencing			30
Hammers, Percussion Cannon			154
Jags, Brass	Brunswick Rifle		3,235
	Rifle Musket, pattern 1851		7,526
	Rifle Arms, 577 bore		861
Locks, Tumblers, hardened and freed	Pistol, 6-inch		1,687
	N. P. Rifle Carbine		1,696
Nails, Side, Musket			5,000
Nipples, Service			25,000
Screws, fixing, for Sights			1,676
Swords, of sorts, with scabbards			1,998
Sights, Rifle Musket, altered			5,328
Springs, Bayonet, Musket			4,563
Sights, Elevating, Rifle Musket, pattern 1851			455
Wrenches, Nipple			3,356

MACHINE ROOM.

Barrels Percussioned	Rifle Musket, pattern 1851		336
	Pistol, 6-inch		1,718
	Carbine, constabulary		48
	N. P. Rifle Carbine		1,506
Locks, jointed and fitted with cocks	Pistol, 6-inch		1,687
	N. P. Rifle Carbine		1,696

J. Wood, Esq., &c. &c. &c.

R. W. Gunner,
Inspector of Small Arms.

Appendix, No. 11.

LETTER from *J. F. Crampton*, Esq., to Lord *Clarendon*, with Enclosures. Appendix, No. 11.

(No. 101.)

My Lord, Washington, 25 April 1854.

Your Lordship will perceive by the accompanying copy of a letter which I have received from the United States Secretary of State, that the Government of the United States have promptly complied with the request of Her Majesty's Government to be supplied with samples of the muskets and rifles made in the Government factories of the United States, which I addressed to them in pursuance of the instructions contained in your Lordship's Despatch to me, No. 51, of the 20th ult. 2.

I have requested the Secretary of War to cause the firearms in question to be delivered to Her Majesty's Consul at New York, and I have instructed Mr. Barclay to forward them to England by the first British Royal Mail steam packet, addressed to the Master-general of the Ordnance, and at the same time to apprise your Lordship of having done so.

I have, &c.
(signed) *J. F. Crampton.*

P.S.—As I was closing this despatch I received a letter from the Ordnance Office of the United States, enclosing to me copies of two reports, showing what parts of the United States national armory musket and rifle are made by machinery, and what is the cost of their production.

I have the honour to transmit herewith copies of these documents. 3.

Lord Clarendon, &c. &c. &c. (signed) *J. F. C.*

Department of State, Washington,
Sir, 18 April 1854.

I have the honour to acknowledge the receipt of your note of the 10th inst., requesting samples of certain firearms made in the Government factories of the United States, and copies of any reports showing what parts of those arms are made by machinery, and what is the cost of their production, for the information of Her Britannic Majesty's Government.

A transcript of your note having been communicated to the Secretary of War, I have now the honour to enclose to you a copy of his reply, from which it will be seen that your request will be complied with, and that the arms in question will be delivered either in this city or in New York, as shall be preferred by you.

I avail, &c.
J. F. Crampton, Esq. (signed) *W. L. Marcy.*

Sir, Ordnance Office, Washington, 22 April 1854.

By direction of the Secretary of War, given in compliance with the request in your note to the Secretary of State of the 10th instant, I send you herewith copies of reports showing what parts of the United States national armory musket and rifle are made by machinery, and what is the cost of their production.

Brevet-Major W. A. Thornton, commanding the United States Arsenal on Governor's Island, has been ordered to deliver one of each of those arms, with its appropriate appendages, to A. Barclay, Esq., Her Britannic Majesty's Consul at New York City.

I have, &c.
(signed) *H. K. Craig,*
J. F. Crampton, Esq. Colonel, Ordnance.

Appendix, No. 11.

REPORT of the PARTS of the PERCUSSION MUSKET made by Machinery at the National Armory, *Springfield*, with the COST of the said Parts severally.

PARTS OF ARMS.	Number per each Musket.	Value.	Amount.
		dolls. cts.	dolls. cts.
Barrels, refined iron	1	2 86.5	2 86.5
Breech screws	1	– 08.6	– 08.6
Cones	1	– 04.6	– 04.6
Tang Screws	1	– 03.2	– 03.2
Bayonet	1	– 95.3	– 95.3
Ditto stud	1	– 00.3	– 00.3
Ditto clasp	1	– 09.5	– 09.5
Ditto ditto, screw	1	– 01.5	– 01.5
Ditto ditto, stop screw	1	– 00.2	– 00.2
Lock plates	1	– 30.	– 30.
Hammer	1	– 30.	– 30.
Tumbler	1	– 21.	– 21.
Ditto screw	1	– 02.2	– 02.2
Bridle	1	– 12.5	– 12.5
Sear	1	– 14.	– 14.
Ditto spring	1	– 08.5	– 08.5
Main spring	1	– 24.	– 24.
Lock screws	4	– 01.5	– 06.
Side screws	2	– 03.2	– 06.4
Upper band	1	– 22.1	– 22.1
Ditto ditto, sight	1	– 00.4	– 00.4
Middle band	1	– 14.	– 14.
Lower ditto	1	– 09.	– 09.
Band springs	3	– 06.6	– 19.8
Side plate	1	– 05.3	– 05.3
Guard plate	1	– 25.	– 25.
Ditto bow	1	– 16.5	– 16.5
Ditto ditto nuts	2	– 01.2	– 02.4
Swivels and rivets	2	– 05.5	– 11.0
Trigger	1	– 08.5	– 08.5
Trigger screw	1	– 01.8	– 01.8
Guard screws	2	– 01.8	– 03.6
Butt plate	1	– 20.	– 20.
Butt plate screws	2	– 02.8	– 05.6
Ramrod	1	– 31.	– 31.
Ditto spring	1	– 07.1	– 07.1
Ditto ditto wires	1	– 00.3	– 00.3
Ditto stop	1	– 01.2	– 01.2
Stocks	1	– 87.4	– 87.4
	TOTAL		8 56.3

COST of APPENDAGES for Percussion Muskets.

NAMES OF APPENDAGES.	Number per each Musket.	Value.	Amount.
		dolls. cts.	dolls. cts.
Wiper	1	– 09.	– 09.
Screwdriver	1	– 12.	– 12.
Ball screw	$\frac{1}{10}$	– 11.	– 01.1
Spring vice	$\frac{1}{10}$	– 18.	– 01.8
Cone (extra)	1	– 04.6	– 04.6
	TOTAL		– 28.5

Appendix, No. 11.

REPORT of the whole Cost of the Percussion Musket as made at the National Armory, *Springfield, Massachusetts.*

	dolls.	cts.
Value of parts of arms made by machinery, as per annexed statement	8	56.3
Assembling and completing lock	–	22.6
Assembling and completing guard	–	02.3
Assembling and completing musket	–	04.
Inspecting finished musket	–	04.
Total Cost of Arm	8	89.2

Note.—The wear and depreciation of tools, machinery, and buildings are included in the cost of the components in the preceding Report.

Springfield Armory, 20 April 1854.

E. S. Allin,
Master Armorer.
Jas. W. Ripley,
Lieut.-Col. U. S. A.

Ordnance Office, Washington, 22 April 1854.
(Authentic Copy.)

H. K. Craig,
Col. Ord.

REPORT of the Parts of Model Rifle made by Machinery at the National Armory, *Harper's Ferry, Va.*, together with the Costs of said Parts severally.

PARTS OF ARMS.	Number for each Rifle.	Value.	Amount.
		dolls. cts.	dolls. cts.
Barrels, cast steel	1	4 20.	4 20.
Breech screws	1	– 09.1	– 09.1
Tang screws	1	– 03.5	– 03.5
Lock plates	1	– 35.	– 35.
Hammers	1	– 34.8	– 34.8
Tumblers	1	– 27.7	– 27.7
Tumbler screws	1	– 02.3	– 02.3
Bridles	1	– 14.	– 14.
Sears	1	– 13.6	– 13.6
Sear springs	1	– 09.5	– 09.5
Main springs	1	– 22.8	– 22.8
Lock screws	4	– 02.2	– 08.8
Side screws	2	– 04.2	– 08.4
Upper bands	1	– 44.	– 44.
Lower bands	1	– 11.	– 11.
Band springs	2	– 07.15	– 14.3
Side plates	1	– 04.5	– 04.5
Guard plates	1	– 29.2	– 29.2
Guard bows	1	– 29.5	– 29.5
Swivels and rivets	2	– 06.8	– 13.6
Triggers	1	– 09.4	– 09.4
Trigger screws	1	– 02.3	– 02.3
Guard screws	1	– 02.2	– 02.2
Butt plates	1	– 30.5	– 30.5
Butt-plate screws	2	– 03.3	– 06.6
Ramrods	1	– 39.	– 39.
Ramrod springs and pins	1	– 08.25	– 08.25
Stocks	1	1 08.	1 08.
Cones	2	– 04.2	– 08.4
Guard bow nuts	2	– 02.4	– 04.8
Boxes	1	– 55.	– 55.
Box screws	3	– 02.1	– 06.3
Box catches	1	– 05.	– 05.
Box springs	1	– 07.6	– 07.6
Box spring screws	1	– 02.2	– 02.2
Total	–	–	10 51.15

Appendix, No. 11.

PARTS OF ARMS.	Number for each Rifle.	Value.	Amount.
		dolls. cts.	dolls. cts.
APPENDAGES:			
Bullet moulds	$\frac{1}{10}$	– 67.	– 06.7
Ball screws	$\frac{1}{10}$	– 07.28	– 00.728
Spring vices	$\frac{1}{10}$	– 15.18	– 01.518
Screw drivers	1	– 12.	– 12.
Wipers	1	– 09.8	– 09.8
TOTAL			– 30.746

REPORT of the whole COST of the MODEL RIFLE as made at the present Time at the NATIONAL ARMORY, *Harper's Ferry, Va.*

	dolls. cts.
Value of parts of arms made by machinery, as per annexed statement	10 51.15
Assembling arms	– 09.
Assembling locks	– 06.
Inspection of arm complete	– 03.
Depreciation in value of tools and machines	– 33.12
TOTAL cost of the arm	11 02.27

Note.—The item of "Depreciation in value of tools and machines" in the above statement is, for the most part, incidental to the abandonment and throwing out of old and worn-out machines heretofore used in the manufacture of rifles, and the substitution of new and improved ones in their stead.

This item will be very materially decreased when all the old machinery is disposed of, but must necessarily continue to enter into the cost of the arm so long as any of it remains.

The depreciation above referred to is about three per cent. on the total cost of the arm.

Saml. Byington,
Master Armorer.

Harper's Ferry Armory,
15 April 1854.

Wm. H. Bell,
Major of Ordnance.

Ordnance Office, Washington,
22 April 1854.

(Authentic Copy.)

(signed) *H. K. Craig,*
Col. Ord.

LETTER from *J. Davis,* Esq., Secretary at War.

Sir, War Department, Washington, 15 April 1854.

I HAVE the honour to acknowledge the receipt of your letter of the 11th instant, enclosing a request from Mr. Crampton, the British Minister, to be furnished with one each of the muskets and rifles made in the United States factories, &c., for the information of his Government, and in reply to inform you, that the request will be complied with, and the arms delivered in this city, or in New York, as Mr. Crampton may prefer.

Very respectfully, &c.
(signed) *Jeffn. Davis,*
Secretary of War.

Hon. W. L. Marcy.

Appendix, No. 12.

RETURN of the Number of Guns, Pistols, and Revolvers Proved in each Year from 1844 to 1854, at the Government Proof House, *Birmingham*, at the *Birmingham* Proof House, and at the *London* Proof House. Appendix, No. 12.

NUMBER of Guns, Pistols, and Revolvers Proved in each Year from 1844 to 1854, at the Government Proof House, *Birmingham*.

DATE.	GUNS.	PISTOLS.	REVOLVERS.
1844 - - - - - -	32,771	3,424	nil.
1845 - - - - - -	35,199	4,535	nil.
1846 - - - - - -	38,655	523	nil.
1847 - - - - - -	35,208	3,636	nil.
1848 - - - - - -	35,286	1,760	nil.
1849 - - - - - -	22,322	nil.	nil.
1850 - - - - - -	1,397	nil.	nil.
1851 - - - - - -	8,028	nil.	nil.
1852 - - - - - -	15,472	nil.	nil.
1853 - - - - - -	4,000	4,730	nil.
1854, to 31st March - - - -	7,450	nil.	nil.

By Order of the Board,

Office of Ordnance, 10 May 1854. (S-3697).

J. Wood, Secretary.

AN ACCOUNT of Gun and Pistol Barrels Proved at the Proof House in Banbury-street, *Birmingham*, from the 16th of March 1844 to the 16th of March 1854, being the last Annual Period at which the Accounts were made up.

DATE.	GUN BARRELS.	PISTOL BARRELS.
From the 16th March 1844 to 16th March 1845 - -	236,603	14,294
„ 16th March 1845 to 16th March 1846 - -	220,409	15,764
„ 16th March 1846 to 16th March 1847 - -	195,226	17,528
„ 16th March 1847 to 16th March 1848 - -	192,295	16,749
„ 16th March 1848 to 16th March 1849 - -	290,286	17,789
„ 16th March 1849 to 16th March 1850 - -	261,070	22,073
„ 16th March 1850 to 16th March 1851 - -	298,504	22,968
„ 16th March 1851 to 16th March 1852 - -	275,563	26,264
„ 16th March 1852 to 16th March 1853 - -	289,016	53,987
„ 16th March 1853 to 16th March 1854 - -	306,932	99,279

There is no separate account kept of Revolvers from other descriptions of Pistol Barrels, each Barrel of a Revolver being reckoned as one Pistol Barrel.

31 March 1854.

Chas. Cresser, Secretary.

Appendix, No. 12.

AN ACCOUNT of the Number of GUNS, PISTOLS, and REVOLVERS Proved at the *London* Proof House in the several Years of 1844 to 1854.

DATE.	GUNS.	PISTOLS.	REVOLVERS.
1844	108,372	13,065	194
1845	109,692	9,333	145
1846	121,710	12,122	102
1847	143,044	5,679	163
1848	141,137	2,750	297
1849	100,224	10,121	386
1850	63,375	4,588	425
1851	33,856	5,744	954
1852	58,813	6,045	6,121
1853	44,631	3,586	13,916

The above Return is made in accordance with an Order of The House of Commons, dated 27th March last, and left at the Proof House of the Gunmakers' Company of London on the 29th ultimo.

By Order of the Master and Wardens,

Geo. Rutherford,

5 April 1854. Clerk of the Gunmakers' Company of London.

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TO

REPORT

FROM THE

SELECT COMMITTEE

ON

SMALL ARMS.

Ordered, by The House of Commons, *to be Printed*,
12 *May* 1854.

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N. B.—In this Index the *Figures* following the Names of the Witnesses refer to the Numbers of the Questions; those following *Ev. p.* and *App. p.* respectively to the paging of the Evidence and the Appendix; and the *Numerals* following *Rep.* to the paging of the Report.]

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2. *Explanation and Defence of the Contract Prices.*

1. *Economy in being manufactured by Government instead of procured by Contract:*

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Non-fulfilment by the time specified of a contract for barrels in 1851, *Sir T. Hastings* 28. 32——The reason urged by the contractor, viz., the very rigid inspection by the viewers, was not considered valid, 28, 29——Details as to the deficiencies in the numbers supplied up to January 1854; reasons assigned by the several contractors in explanation of the non-fulfilment of their agreements on this point, *ib.* 41-74. 129-135——Penalty for each barrel not delivered at the proper time, *ib.* 64-67——Excuses made for the non-delivery of barrels for the contract of 1853; *ib.* 301.

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Contract price in 1851 for the barrels in the rolled state, and cost of bringing them into the filed state, *Sir T. Hastings* 26-28——Circumstance of only seven tenders having been received for the supply of barrels in 1853; and all at the same price, viz., 14 *s.* a barrel, *ib.* 35-39——Steps taken thereon which led to the reduction of the price to 13 *s.*, *ib.* 40, 41——Letter from Mr. Lovell, inspector at Birmingham, in 1851, with reference to the contracts for barrels in 1851 and at previous periods, and bearing witness to the combination about price existing among the manufacturers, *ib.* 286——Consideration of the charge brought against the barrel contractors of combining to charge 21 *s.* for musket barrels in their tenders for the contract of 1839, *ib.* 1339-1350——The contractors who asked 21 *s.* for the barrels, eventually took the contracts at 13 *s.* 6 *d.* the barrel, the real value being about 12 *s.*, *ib.* 1348-1350.

Explanation of the different charges for barrels in 1851 and 1853, *Millward* 3266-3270——Explanation with respect to the contractors having asked 21 *s.* for barrels in 1838-39, and subsequently taking 13 *s.*; letter on the subject by Mr. Manton, Ordnance inspector at the time, *ib.* 3350-3353——Erroneousness of Mr. Lovell's calculations with regard

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II. *Cost*—1. Contract Prices—*continued.*

regard to the cost of, and profit upon, gun barrels, *Millward* 3397-3404——Witness would undertake to furnish 2,000 barrels monthly, or the contractors generally 150,000 barrels yearly, at 10*s.* 6*d.* each barrel, *ib.* 3405-3412.

2. Means of Reduction:

Reduction to be effected in the cost by an alteration in the pattern, *Millward* 3266. 3270. 3419, 3420; *Rep.* vii——Saving which might be effected in the barrel by finishing it less, *J. Gunner* 4793, 4794——There is about 2*s.* at present uselessly expended on the outside of the barrel, *Richards* 7861.

III. *System of View; Rejections:*

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2. Outlay proposed:

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3. Boring:

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Advantage of boring the barrel by causing it to revolve, and by keeping the tool fixed, instead of the present awkward process, *Prosser* 2751-2765. 2776-2778——Defects of the present mode of boring barrels; it is a more perfect but a more expensive process to bore from a solid, *Sir T. Hastings* 3113-3124——There has been no improvement for many years in the method of boring the barrels, *Millward* 3307——Occasional boring in America out of a solid adverted to, *ib.* 3308——Possible improvements to be made in rough boring, *ib.* 3309——Manner in which fine boring is done at present, *ib.* 3310.

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VI. *Enfield:*

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VIII. *Papers laid before the Committee:*

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See also *Barrel-rollers. Birmingham Small Arm Department. Beasleys & Farmer. Clive, Henry. Clive, John. Contracts. Deakins, Mr. Gauges. Iron. Millwood, Ezra. Osborne's Patent. Rifling Machinery. Supply,* 2. *Twisted Barrels. View* (*Birmingham*).

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BAYONETS:

1. *Sundry Contracts for Bayonets adverted to; Causes of Delay in their Fulfilment explained.*
2. *Adequacy of the Trade to provide the requisite Supplies.*
3. *Cost; Reduction feasible by applying Machinery and altering the Pattern.*
4. *Extent to which further Machinery may be employed, considered.*
5. *Other Evidence generally.*

1. *Sundry Contracts for Bayonets adverted to; Causes of Delay in their Fulfilment explained:*

Orders for bayonets, &c. previously to 1851, executed by witness's firm for the Government and the East India Company, *Lawrence* 3769-3771. 3784, 3785——Peculiar severity of the view in the matter of bayonets ordered in 1851, *ib.* 3770, 3771——Alteration in the pattern referred to in the contract specification; complaint thereof by witness to Mr. Francis Lovell; subsequent interview with Mr. Lovell, senior; and final redress given to witness by Sir Thomas Hastings and General Fox, *ib.* 3771-3783——Peculiar course pursued by Mr. Lovell in recovering possession of the bayonet pattern, *ib.* 3776——Remarks made by him about the contract price; inference therefrom, *ib.* 3777-3779——Supply finally undertaken by witness's firm at 3 *s.* each bayonet; vexatiousness of the view to which they were subjected, *ib.* 3782, 3783.

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Reasons for witness being behind-hand with his present order, *Lawrence* 3797, 3798. 3805, 3806——He will eventually make up the arrears, *ib.* 3807, 3808——Complaint on the score of there being only one pattern bayonet among the several contractors, *ib.* 3809-3818——Explanation of the reference about "the scarcity of good workmen," in the letter of witness's firm to the Board, dated 8 October 1853, *ib.* 3906-3914——Illness of witness's blade-forger referred to as a further cause of delay in the completion of the present contract, *ib.* 3941.

Delay in supplying the bayonets contracted for by witness in 1853, attributed chiefly to the difficulty in obtaining the pattern, *Aston* 5156-5163——Reference to a letter from witness to the Board, dated 9 February 1854, relative to some bayonets, the rejection of which is not attributed to the view, *ib.* 5272, 5273.

Causes assigned by contractors for delay in fulfilling their contracts, *App. p.* 462-464. 467, 468——Particulars of contracts in 1851 for bayonets for 23,000 musket rifles, *ib.* 482, 483.

2. *Adequacy of the Trade to provide the requisite Supplies:*

Witness could produce from 10,000 to 15,000 bayonets yearly, *Lawrence* 3829——With a fair view Birmingham could produce about 90,000 in the first year of a contract, *ib.*——If a contract for 150,000 bayonets yearly were to extend over five years, the present contractors would be able to supply the same, *ib.* 3830-3898——Opinion that there would be no lack of labour in fulfilling any large and consecutive order for bayonets, *ib.* 3937.

3. *Cost; Reduction feasible by applying Machinery and altering the Pattern:*

The contract cost of the bayonet in 1849 was 2 *s.* 10 *d.*; it has since been improved, and now costs 7 *s.* 6 *d.*, *Sir T. Hastings* 152, 153——Opinion that Government could provide it for 1 *s.* 6 *d.*, *ib.* 154, 155——The bayonet, especially, may be made at a much less cost by machinery, *Anderson* 964——Grounds for the opinion that the cost of the bayonet may, by machinery, be reduced from 7 *s.* 6 *d.* to 2 *s.* 6 *d.*, *Lancaster* 2423, 2424, 2549-2562——A bayonet of equal efficiency could be made for 4 *s.* 6 *d.* or 5 *s.*, *Richards* 7858.

Explanation as to the contract price in 1851 being 2 *s.* 6 *d.* each bayonet instead of 2 *s.* 10 *d.*, the former contract price, *Lawrence* 3765. 3769——Extreme difference between the former bayonet contracted for at 2 *s.* 10 *d.* and the Minié rifle bayonet, which costs 7 *s.* 6 *d.*, *ib.* 3857-3861. 3899-3905. 3936——Statement showing respectively the cost

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1. *Cost, &c.*—continued.

of the materials, and the margin left for labour and profit, in the old and in the new bayonet; the latter requiring three times as much workmanship as the former, does not admit of any analogy, *Lawrence* 3865-3876. 3899-3905. 3928-3936——The materials of the present bayonet cost 1 *s.* 3 *d.*, leaving 6 *s.* 3 *d.* for labour and profits, *ib.* 3876——The materials of the old bayonet cost about 8 *d.*, leaving 2 *s.* 2 *d.* for labour and profit, *ib.* 3930——Causes of the present high price of bayonets, *Aston* 5164-5167.

Impossibility of the present pattern bayonet being made for 2 *s.* 6 *d.*, *Prosser* 2861-2869——Conviction that the economy anticipated from machinery is quite illusory, *Lawrence* 3795, 3796——A contract for 100,000 bayonets of the present pattern would not be taken at 5 *s.* each, *ib.* 3831, 3832——Impracticability of reducing the cost of the present bayonet to 1 *s.* 6 *d.*, *ib.* 3894-3897——Reduced cost if consecutive orders were given, *Aston* 5168-5172——Opinion that further machinery cannot be used with economy in making bayonets, *Tranter* 6196-6198. 6256.

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4. *Extent to which further Machinery may be employed, considered:*

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Impracticability of making the bayonet in its present shape by machinery, *Prosser* 2869-2872——Application of machinery to the manufacture of bayonets ordered in 1853, adverted to and explained, *Lawrence* 3792——Criticisms upon, and objections to Mr. Anderson's proposed machines for the manufacture of bayonets, *ib.* 3793, 3794——Consideration of the different machinery which might be applied to the manufacture *ib.* 3877-3892——Employment of machinery by witness to a limited extent in making bayonets, *Aston* 5154, 5155.

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See also *Blade-forgers.* *Evans, William.* *Iron.* *Oscillating Steel Dies.* *Ryder's Forging Machine.* *Steam-hammer.*

Bayonet-springs. Superiority of the bayonet-spring of the East India Company's new line musket over that of the Board of Ordnance, *Bond* 6602——Reference to the adoption, by the East India Company, of an alteration suggested by a gun maker in the bayonet-spring, *Clark* 7392. 7395, 7396.

Beasleys and Farmer. Non-delivery of rifle musket barrels as contracted for by them in 1853, *Sir T. Hastings* 44——Reason assigned, *ib.* 57, and *App. p.* 463-466——Complaint by them of the rigid view of their barrels, *App. p.* 449——Report thereon by Mr. F. G. Lovell, *ib.* 449, 450——Particulars of several contracts for barrels taken by them, *ib.* 472. 475-478. 480. 482-484.

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BELGIUM:

1. *Characteristics of the Gun Trade generally.*
2. *Particulars as to the Government Factory at Liege.*
3. *Cost and Quality of the Minié Rifle; Comparison with the English Arm.*

1. *Characteristics of the Gun Trade generally:*

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1. *Characteristics of the Gun Trade generally*—continued.

Belgian than of the English gun trade, *Gordon* 4360-4368——Its greater cheapness, *ib.* 4361——Greater use of machinery therein, *ib.* 4361-4363——Number of the Belgian army adverted to in connection with the supply of arms, *ib.* 4667-4670.

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2. *Particulars as to the Government Factory at Liege:*

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There are 750 workmen in the Government factory at Liege, including 150 soldiers, who are afterwards distributed as armourers through the several regiments, *Gordon* 4413. 4662-4666——System of paying for labour by piecework; average daily earnings, *ib.* 4484-4486. 4563-4566——Cost of the factory adverted to, *ib.* 4531——Other description of work besides gun making on which the 750 workmen are employed, *ib.* 4659-4662. 4671, 4672——Course pursued towards the workmen in the event of a less amount of labour being required, *ib.* 4664-4666——How far the manufacture of the Belgian rifle may be said to take place in one building, *J. Gunner* 4863-4869.

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3. *Cost and Quality of the Minié Rifle; Comparison with the English Arm:*

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Birmingham Gun Trade. See *Gun Trade*, 1. 2. 4.

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Long detention of barrels in the Ordnance machine-room at Birmingham adverted to, *Swinburne* 5392——Similar detention of the materials for the present artillery carbines, *ib.* 5393, 5394. 5559–5570——Considerable delay in the contracts for setting up muskets has been occasioned by the unnecessarily long detention of some of the materials in the Ordnance machine-room, *Sheath* 5747–5754. 5866–5878——Nature of the work done in the machine-room; advantage if performed by the contractors, *ib.* 5750–5754——Probable reasons for the materials being detained so long in the machine-room, *ib.* 5901, 5902.

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Blade-forgers. Instance of the difficulty of procuring blade-forgers on bayonet contracts, *Lawrence* 3941.

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2. *Supply by the London Trade.*
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1. *System of Contract pursued; its Success:*

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3. *Recommendations by the Committee.*

1. *General Particulars as to the Government Establishment:*

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1. *Generally:*

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Government Factory:

1. *Evidence generally in Explanation and Support of the proposed Factory.*
2. *Estimates of Mr. Anderson; their Sufficiency.*
3. *Site considered; Plan proposed.*
4. *Evidence opposed to the Scheme; Alternative suggested.*
5. *Resolutions of the Committee.*

1. *Evidence generally in Explanation and Support of the proposed Factory.*

In lieu of the present contract system, witness proposes the establishment of a Government factory for the manufacture of guns almost exclusively by machinery, as being much more economical and efficient, *Sir T. Hastings* 122–124, 174 *et seq.*——In illustration of the expediency of a Government factory, witness refers specially to the American Government, who produce all their muskets in their own factories, at a cost of less than 2*l.* each, *ib.* 181–186. 238–241. 735-755——The system of Government manufacture should refer only to things not in ordinary use, *ib.* 186. 196——Belief that such factories would not destroy the gun trade generally throughout the country, *ib.* 227——No contract for machinery has yet been entered into, *ib.* 261——Conviction that a Government factory is the most sure and efficient means of obtaining supplies of arms proportionate to the demand, *ib.* 316-318.

Report by witness to the Board of Ordnance, in September 1853, wherein he advocates the substitution of machinery for the present defective system of obtaining small arms, *Anderson* 338, 339——Further report in December 1853, advocating the establishment of a Government factory for making muskets by machinery, as the cheapest and most efficient system, *ib.* 342——Explanation, by reference to a map, of the mode of construction of the manufactory proposed by witness, *ib.* 349——Detailed suggestions in regard to the consecutive operations to be adopted therein, *ib.* 349, 350. 369, 370——A thorough man of business would be required to superintend the working of the several forging machines, *ib.* 355——Rigid tests of accuracy to which the separate parts of the musket would be submitted before the setting-up process, *ib.* 369——Witness has no personal interest whatsoever in the establishment of a Government factory, *ib.* 1067.

Reference to the conclusions arrived at by a committee of officers sent into the manufacturing districts in January last, with reference so the contemplated use of machinery by the Board of Ordnance, in the manufacture of small arms, *Anderson* 343——Witness was one of this committee, *Tulloh* 418. 609-612——Instructions received by the committee from the Master-general of the Ordnance, *ib.* 4188–420. 610–613——Details of the investigations of the committee; manufactories visited by them, *ib.* 421–428. 432–437——Further reference to the objects of the committee; more complete investigation into the present subject matter contemplated, *ib.* 609-615.

Reasons put forth by witness and Colonel Chalmers in support of the establishment of a Government factory for producing muskets by machinery, *Tulloh* 443——Great saving that would be effected, *ib.*——Data on which they reported in its favour, *ib.* 509–516. 562 *et seq.*, *ib.*——Witness was till recently in favour of relying on the trade of Birmingham, &c., for the supply of small arms, *Sir T. Hastings* 687——Resumé of the circumstances under which, about the beginning of the present year, he deliberately concluded that a

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GOVERNMENT FACTORY—continued.

1. *Evidence generally in Explanation, &c.*—continued.

Government factory was expedient, *Sir T. Hastings* 688. 3083. 3099-3101——Time required to bring the establishment into working order, *Anderson* 985-989; *Nasmyth* 1397, 1398. 1541-1545; *Whitworth* 2185-2188; *Lancaster* 2305.

Contemplated introduction of a large amount of unskilled labour in connexion with self-acting machines, *Collinson* 1281-1288——Slight improvement expected to be made on the machinery first designed for the proposed factory, *Nasmyth* 1438, 1439——Importance of appointing the employés on the score of merit, *ib.* 1445, 1446——Importance of Government undertaking the manufacture in one great establishment, rather than of its being still submitted to private parties, *ib.* 1582-1586. 1611-1626——Expediency of the proposed factory, *Chalmer* 1822-1838——Witness relies on the establishment of a Government factory, as the only means of obviating the present difficulties of supply, *Lord Raglan* 1856-1858. 1906——Expediency of the Government manufacturing the required quantity without any resort to the private trade, *ib.* 1874-1877——How far the cost of production of small arms may be less under the present system of resorting to manufactures generally, than under a system of Government production only, *J. Gunner* 5066-5072.

2. *Estimates of Mr. Anderson; their Efficiency:*

The estimate prepared by witness of the cost of the proposed Government factory for the production of 500 muskets daily, is only an approximate one, but is calculated so as fully to cover the outlay, *Anderson* 373-376. 388——Division of the estimate into three large items, showing the objects to be provided under each head; (more detailed estimate ordered by the Committee), *ib.* 375——The sum of 150,000 *l.* will fully cover the entire costs, *ib.* 377——Estimated annual expense of keeping the machinery in complete working order, *ib.* 378-384——The total number of workmen, and boys and girls required, would be about 1,000, *ib.* 379——Calculation of the weekly and annual amount of their wages, *ib.* 380-384. 798-800——Estimated annual cost of the fuel for the steam-engine's furnaces and forges, *ib.* 385-388——Estimated cost of the material for producing 150,000 muskets yearly, as contemplated, *ib.* 386.

Estimated annual cost of the establishment independently of the wages of the workpeople, *Anderson* 387——Estimated total annual expenditure to be incurred in producing 150,000 muskets, *ib.* 388——Sufficiency of this estimate, *ib.*——The first 150,000 muskets will probably cost from 35 *s.* to 40 *s.* each, but on the operations being thoroughly understood, the cost will be somewhere between 20 *s.* and 30 *s.*, *ib.* 389——The probable estimate of the cost of the foundation, buildings, &c., is 50,000 *l.*, *ib.* 813, 814; *Ev. p.* 84——Examination as to the saving in fuel to be effected by the use of steam-engines, 860-879——The cost of the muskets could not be much enhanced, if double the estimated amount of labour were required, *ib.* 969-971.

With respect to the machinery to be adopted, witness cannot give a detailed account or estimate of the same, but feels convinced that the saving to be effected will be very great, *Anderson* 972-974. 983-998. 1006 *et seq.*——Opinion of Colonel Colt that an outlay of 100,000 *l.* would be sufficient to establish the proposed factory, *ib.* 974——Expediency under certain circumstances of occasionally adding to the estimated original outlay of 168,000 *l.*, *ib.* 983-988——Data for the conclusion that an establishment erected for 168,000 *l.* will produce 500 muskets daily, *ib.* 984. 996-998——Greater average cost per musket if instead of 150,000 muskets yearly, only 30,000 should be required, *ib.* 1011-1013. 1052-1056——Time which witness would require in America, in order after a minute inspection of the musket manufacture there, to report and estimate more fully upon the proposed scheme, *ib.* 1064-1066. 1070-1074——Paper containing an approximate estimate of the cost of the buildings, machinery, &c. &c.; the aggregate sum is 150,000 *l.*, *ib.* 1075; *Ev. p.* 84.

Confidence of witness in the estimates and opinions of Mr. Anderson, *Tulloh* 502-508; *Lord Raglan* 1895-1897. 1907-1912; *Sir T. Hastings* 3110. 3125. 3131, 3132. 3155——The only estimates of the cost of the establishment and of the muskets, are those prepared by Mr. Anderson, *Tulloh* 645-647——Remarks on Mr. Anderson's estimates, *Colt* 1096-1101——Sufficiency of the estimate of 50,000 *l.* for the foundation, building, &c., *Collinson* 1269-1276——Sufficiency of the estimates generally, *Nasmyth* 1392-1396. 1399-1402. 1440. 1531-1540. 1653-1655——Expediency of substituting high-pressure steam engines for the two expensive condensing engines included in Mr. Anderson's estimate, *ib.* 1655, 1656.

With respect to the anticipated expenditure in providing small arms, witness fully believes that the requisite machinery will be duly forthcoming, *Sir T. Hastings* 3153-3159——Conviction that the proposed factory will be fully equal to the supply of 72,000 Minié rifles over a period of six months, *ib.* 3177, 3178——A contract could at once be entered into for the completion of the building and machinery within the estimated time, *ib.* 3178, 3179.

3. *Site*

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GOVERNMENT FACTORY—continued.

3. *Site considered; Plan proposed:*

Reasons for preferring Woolwich to Enfield as the locality for the factory, *Tulloh* 619-624; *Collinson* 1278-1281——With respect to the proposed site at Woolwich, the foundations are not good, *Sir T. Hastings* 678-683——There would be much greater facility in providing the necessary labour at Woolwich than at Enfield, *Collinson* 1279——The site at Woolwich adverted to as providing for any subsequent enlargement of the original plan, *ib.* 1295-1299——Objection to Enfield as the locality for the proposed factory, *Lord Raglan* 1918——Disadvantages of Enfield as compared with Woolwich; difficulty as regards labour; also as regards houses for the workmen, there not being sufficient Government land to build upon, *J. Gunner* 4978-5002. 5028-5043.

Plan of the proposed factory, *Ev. p.* 30.

4. *Evidence opposed to the Scheme; Aternative suggested:*

Failure of witness in his first efforts to manufacture arms with profit; possible inference therefrom, supposing the efforts were made on behalf of Government, *Colt* 1186-1189——As a general principle Government manufacture is not an economical system, *Whitworth* 2233-2235——Necessary expense in keeping up a large establishment, the machinery of which would not be in constant use, *Lancaster* 2600-2605——Objectionable manner in which Government conduct their mechanical operations generally, *Prosser* 2835*-2838——Anticipated insufficiency of Mr. Anderson's estimate if the proposed factory be carried out, *ib.* 2858, 2859. 2877-2886.

Greater economy of manufacture by contractors for the whole arm than by Government, *Swinburne* 5502-5556——Injurious effects upon the trade if Government should manufacture all their own arms, *Hunt* 6720——Disadvantage on the score of cost and quality in the Government manufacturing their own muskets, *Richards* 7824-7828——Injudiciousness of laying out 150,000*l.* for the purpose of producing arms as proposed, *ib.* 7852-7854——Impossibility of Government manufacturing 150,000 Minié rifles for an outlay of 140,000*l.*, *ib.* 7855, 7856.

Suggestion that the Government should not produce so many as 500 muskets daily, but should, by manufacturing a certain quantity, act as a check and example to the private manufacturers, *Whitworth* 2082-2084. 2162-2165. 2180-2184. 2228-2230——Partial extent to which Government should invest capital in the manufacture of muskets, *Prosser* 2839-2841.

They should only undertake stocking and setting up, *Prosser* 2842-2844——They should cease to manufacture, if not able to compete with the private trade, *ib.* 2845——Inexpediency of a Government manufacture of muskets; alternative preferable, *Goodman* 3538.

5. *Resolutions of the Committee:*

Resumé of the evidence given in support of a Government manufacture of small arms, *Rep.* iv, v——No connexion between the question of an increased use of machinery and of the establishment of a Government factory, *ib.* vii.

Resolution of the Committee that sufficient evidence has not been given to satisfy them that a Government factory would afford the cheapest, most expeditious, and most efficient mode of providing muskets, *Rep.* x——Recommendation that a manufactory of small arms, under the Board of Ordnance, should be tried to a limited extent, *ib.*——Advantages of a factory on a limited scale, as opposed to the disadvantages of the extensive plan proposed by the Board of Ordnance, *ib.*

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Granulating Machines. Particulars as to the machines for granulating gunpowder at Waltham Abbey, invented by Mr. Anderson, in accordance with estimates previously prepared by him; peculiar advantages of these machines, *Tulloh* 518-547. 550-553. 556-561.

Guard of Musket. Alteration proposed in the shape, *Anderson* 362——Feasibility of producing the guard by machinery, *Nasmyth* 1388, 1389. 1680——The efficiency of the guard would not be affected by the alteration proposed by Mr. Anderson in its shape, *Chalmer* 1839. 1841, 1842.

GUN TRADE:

1. *Its Characteristics and Resources generally.*
2. *Birmingham.*
3. *London.*
4. *Number of Workmen employed.*

1. *Its Characteristics and Resources generally:*

Backwardness of the gun trade in not employing machinery, *Anderson* 333-337; *Nasmyth* 1608, 1609——Expediency of all the parts of a musket being manufactured in one

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1. *Its Characteristics and Resources generally*—continued.

one establishment, *Nasmyth* 1611–1620. 1670–1678; *Lancaster* 2361–2363——If there were private establishments sufficiently comprehensive for the manufacture of muskets in a proper manner, a Government factory would be uncalled for, *Nasmyth* 1622——Special knowledge required in the manufacture of guns, *Whitworth* 2078–2081——Special advantages of one comprehensive establishment for the manufacture of muskets by machinery, over several establishments relying on manufacture chiefly by means of manual labour, *Lancaster* 2594. 2600.

Progress and improvements being gradually made in the gun trade, *Goodman* 3593——Respects in which the English gun trade is behindhand as regards the employment of machinery, *Richards* 7683–7689. 7714–7717——Belief that the trade could supply 50,000 in the first year, 100,000 in the second, and 150,000 or 200,000 in the third year, *ib.* 7694——Increase in the English gun trade as regards the superior and inferior classes of arms, *Rep.* viii——Advanced position of the English gun trade as compared with other countries, *Richards* 7816–7819——Twofold advantage in a national point of view of the existing gun trade to this country, *ib.* 7848–7851.

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Locks:

1. *Character and Cost of the Minié Rifle Lock.*
2. *Contracts; System of View.*
3. *Further Employment of Machinery in the Manufacture recommended and considered.*
4. *America (Springfield).*
5. *Belgium.*
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1. *Character and Cost of the Minié Rifle Lock:*

Contract prices in 1849 and at the present time for gun locks; difference in the character of the locks, *Sir T. Hastings* 144–152——Want of uniformity in the locks of the Minié rifles, *Whitworth* 2217–2224——Circumstance of the parts of two hand-made locks having been taken asunder and interchanged with perfect fitness, *Prosser* 2791–2803——The lock of the Minié rifle is superior to Colonel Colt's lock, *Sir T. Hastings* 3150–3152; *Brazier* 3973, 3974——Excellence of the workmanship of the musket lock, *ib.* 3963——Alteration suggested by witness in the pattern, and adopted by the Ordnance, *Brazier* 3981–2990——Feasibility of interchange of the parts of the present lock, *ib.* 4003, 4004——Saving which might be effected in the lock by finishing it less and altering the construction, *J. Gunner* 4793. 4796–4800.

2. *Contracts; System of View:*

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3. *Further Employment of Machinery in the Manufacture recommended and considered:*

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1. *Economy and Efficiency anticipated from its further Employment in the Manufacture of Muskets.*
2. *Advantages of Machinery inferred from its Adoption by Colonel Colt, and in America.*
3. *Extent to which it may be substituted for Hand Labour.*
4. *No Economy anticipated from its Introduction, as proposed.*
5. *Other Evidence as to its present and further Employment, &c.*
6. *Comments and Conclusions of the Committee.*

1. *Economy and Efficiency anticipated from its further Employment in the Manfacture of Muskets.*

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1. *Economy and Efficiency anticipated, &c.*—continued.

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2. *Advantages of Machinery inferred from its Adoption by Colonel Colt, and in America:*

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3. *Extent to which it may be substituted for Hand Labour:*

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4. *No Economy anticipated from its Introduction, as proposed:*

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2. *Progressive Grooves.*

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2. *Contracts; System of View.*
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1. *How far the System has been found insufficient hitherto.*
2. *Capabilities of the Gun Trade, in regard to future Supply, considered.*
3. *Offer made by Colonel Colt.*
4. *Other Means of Supply besides the Contract System.*
5. *Resumé by the Committee.*

1. *How far the System has been found insufficient hitherto:*

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3. *Offer made by Colonel Colt:*

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2. *Written Instructions to the Viewers.*
3. *Defence of Mr. Lovell as Inspector.*
4. *Rejections.*
5. *System of Appeal; Alteration proposed.*
6. *Present Conduct of the View by Mr. Gunner; its Fairness.*
7. *Future System to be pursued, considered.*
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TO

REPORT

FROM

THE SELECT COMMITTEE

ON

SMALL ARMS.

Ordered, by The House of Commons, *to be Printed,*
12 *May* 1853.

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REPORT

FROM THE

SELECT COMMITTEE

ON

THAMES MARSHES;

TOGETHER WITH THE

PROCEEDINGS OF THE COMMITTEE,

MINUTES OF EVIDENCE,

APPENDIX, AND INDEX.

Ordered, by The House of Commons, *to be Printed,*
17 *July* 1854.

378.

Martis, 20° *die Junii*, 1854.

Ordered, That a Select Committee be appointed to inquire into the Sanitary and Agricultural State of the Marshes on the Sides of the Thames, the Means for their Improvement, the existing Legal Powers for the Purpose, and the necessity for further Legislation thereon.

Veneris, 23° *die Junii*, 1854.

Committee nominated of,—

Sir Edmund Filmer.
Lord Dudley Stuart.
Lord Robert Grosvenor.
Sir John Shelley.
Mr. Alderman Cubitt.
Viscount Bernard.
Mr. Montague Chambers.
Mr. Thomas Greene.
Mr. James MacGregor.
Sir William Smijth.
Mr. Wilkinson.
Mr. Frewen.
Mr. Masters Smith.
Mr. Vansittart.
Colonel Dunne.

Ordered, That the Committee have power to send for Persons, Papers, and Records.

Ordered, That Five be the Quorum of the Committee.

Lunæ, 17° *die Julii*, 1854.

Ordered, That the Committee have Power to Report their Observations, together with the Minutes of Evidence taken before them, to The House.

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REPORT.

THE SELECT COMMITTEE appointed to inquire into the Sanitary and Agricultural State of the MARSHES on the Sides of the THAMES, the Means for their Improvement, the existing Legal Powers for the Purpose, and the Necessity for further Legislation thereon:——HAVE considered the Matters to them referred, and have agreed to the following REPORT:

THE terms of the Order of Reference to the Committee would have admitted of a more extended investigation; but the Committee have felt justified, at the present period of the Session, in confining their inquiry to the condition of the Marshes on the banks of the Thames below London Bridge, which it appears extend over 32,000 acres, and are under six distinct commissions of sewers.

It appears from the evidence of highly intelligent and eminent gentlemen of the medical profession residing in the neighbourhood of the Marshes on both sides of the Thames below London Bridge, that the diseases prevalent in those districts are highly indicative of malarious influence, ague and fever being very prevalent; and that the sickness and mortality is greatest in those localities which adjoin imperfectly drained lands, and far exceed the usual average; and that ague and allied disorders frequently extend to the high grounds in the vicinity. In those districts where a partial improvement in the drainage has been effected, a corresponding improvement in the health of the inhabitants is perceptible.

The Committee have inquired more particularly into the state of the marshes adjoining the Royal Arsenal at Woolwich, which they had reason to believe gave a fair representation of the state of the other marshes.

The mortality of Woolwich, particularly East Woolwich, is much higher than the average. Woolwich adjoins the Plumstead and Erith Marshes, where the water is frequently dammed up, which increases the quantity of decaying vegetation and malaria, and the description of ague from which people suffer in that neighbourhood is stated to be very distressing, and to produce many complications of disease. 19. 56. 71.

It appears also, that in the neighbourhood of Woolwich and Charlton, many houses have been built, and are building, whose drainage empties itself into the marsh ditches; this seems to Your Committee a new source of miasma of dangerous character, and one likely to increase.

To remove such evils is an object obviously deserving the attention not merely of the landowners and residents in the district, but of the Legislature, and it is most satisfactory to find, from the evidence before Your Committee, that there is good reason to believe that the increased value given to the lands by improved drainage would be such as amply to remunerate the proprietors for the necessary cost attending such works.

And with regard to the means to be employed, it was proved that no engineering difficulties exist.

The existing legal powers of the Commissioners of Sewers are inadequate to effect these objects. The authority of the Commissioners enables them to maintain existing works, but they cannot interfere with the private ditches, nor can they construct any new works without the previous consent of three-fourths of the owners and occupiers.

615. 754.

It appears, however, that any plan of effective drainage would require an amount to be expended in a single year, which, in justice to all interests, should be raised by loan, and repaid by annual instalments spread over a period of years.

In order to carry out the improvements which the Committee consider to be indispensable, it will be necessary to provide some means for ascertaining the due proportion of interests in the lands to be dealt with, which shall be sufficient to bind the minority. The Committee suggest, that the poor's rate assessment offers, at the present time, the best criterion for ascertaining the proportionate interests.

The Committee recommend that additional powers be given by the Legislature to the Commissioners of Sewers to enable them to carry out a more effective system of drainage, which would be beneficial alike in a sanitary and agricultural point of view. The Committee further suggest that the number of the Commissioners should be diminished, and that an alteration might be advantageously made in the mode of their appointment by the introduction of the elective principle.

528. 742.

17 *July* 1854.

PROCEEDINGS OF THE COMMITTEE.

Jovis, 29° *die Junii*, 1854.

MEMBERS PRESENT:

Sir E. Filmer.	Sir John Shelley.
Mr. Alderman Cubitt.	Sir W. Smijth.
Mr. MacGregor.	Mr. Wilkinson.
Lord Dudley Stuart.	Mr. Vansittart.
Colonel Dunne.	Mr. Greene.

Sir E. FILMER was called to the Chair.

[Adjourned to Eleven o'clock To-morrow.

Veneris, 30° *die Junii*, 1854.

MEMBERS PRESENT:

Sir E. FILMER, in the Chair.

Sir John Shelley.	Mr. Wilkinson.
Mr. Masters Smith.	Colonel Dunne.
Mr. MacGregor.	Lord Dudley Stuart.
Mr. Alderman Cubitt.	Mr. Vansittart.
Mr. Greene.	

The Committee examined Mr. *Bossey*, Mr. *Stewart*, Mr. *Farr*, the Rev. *W. Acworth*, Mr. *Dickson*, and Mr. *Storkley*.

[Adjourned to Friday, 7th July, at Twelve o'clock.

Veneris, 7° *die Julii*, 1854.

MEMBERS PRESENT:

Sir E. FILMER, in the Chair.

Mr. MacGregor.	Mr. Wilkinson.
Mr. Masters Smith.	Lord Dudley Stuart.
Mr. Alderman Cubitt.	Sir John Shelley.
Mr. Vansittart.	Colonel Dunne.

The Committee examined Mr. *South*, Sir *Culling Eardley*, Mr. *Pinching*, Mr. *Russell*, Dr. *Corbett*, Mr. *Heath*, Dr. *Manley*, Mr. *Hayward*, Mr. *Hall Dare*, and Mr. *Westwood*.

[Adjourned to Tuesday, at Twelve o'clock.

Martis, 11° *die Julii*, 1854.

MEMBERS PRESENT:

Sir E. FILMER, in the Chair.

Mr. MacGregor.	Colonel Dunne.
Mr. Alderman Cubitt.	Sir John Shelley.
Mr. Greene.	Mr. Vansittart.
Mr. Masters Smith.	

The Committee proceeded to the consideration of their Report, and a Draft of Report was proposed by the Chairman, read 1°, and ordered to be printed.

[Adjourned to Friday next, at One o'clock.

Veneris, 14° *die Julii*, 1854.

MEMBERS PRESENT:

Sir E. FILMER, in the Chair.

Mr. MacGregor.	Mr. Wilkinson.
Colonel Dunne.	Sir John Shelley.
Mr. Greene.	Lord Dudley Stuart.
Mr. Vansittart.	Mr. Alderman Cubitt.

Draft Report of the Chairman was read 2° as follows:

"THAT it appears from the evidence of highly intelligent and eminent gentlemen of the medical profession residing in the neighbourhood of the marshes on both sides of the Thames below London Bridge, that the diseases prevalent in those districts are highly indicative of malarious influence, ague and fever being very prevalent; and that the sickness and mortality is greatest in those localities which adjoin imperfectly drained lands, and far exceed the usual average; and that ague and allied disorders frequently extend to the high grounds in the vicinity. In those districts where a partial improvement in the drainage has been effected, a corresponding improvement in the health of the inhabitants is perceptible.

19. 56. 71. "The mortality of Woolwich, particularly East Woolwich, is much higher than the average. Woolwich adjoins the Plumstead and Erith Marshes, where the water is frequently dammed up, which increases the quantity of decaying vegetation and malaria, and the description of ague from which people suffer in that neighbourhood is stated to be very distressing, and to produce many complications of disease.

Vide Mr. Eastern's Evidence. "That with respect to the condition of the marsh lands as affecting agriculture, it was proved to the satisfaction of the Committee that great benefit would be derived from a system of drainage for sanitary purposes, while at the same time the value of the land would be increased beyond the outlay.

"And with regard to the means to be employed, it was proved that no engineering difficulties exist.

615. 754. "The existing legal powers of the Commissioners of Sewers are inadequate to effect these objects. The authority of the Commissioners enables them to maintain existing works, but they cannot interfere with the private ditches, nor can they construct any new works without the previous consent of three-fourths of the owners and occupiers.

528. 742. "The Committee recommend that additional powers be given by the Legislature to the Commissioners of Sewers to enable them to carry out a more effective system of drainage, which would be beneficial alike in a sanitary and agricultural point of view. It will be for the Legislature to determine whether an alteration may not advantageously be made in the mode of appointing the Commissioners of Sewers, to whom new powers may be delegated."

The following paragraph (Mr. *Greene*) brought up, and read 1° as follows: "The terms of the Order of Reference to the Committee would have admitted of a more extended investigation; but the Committee have felt justified, at the present period of the Session, in confining their inquiry to the condition of the Marshes on the banks of the Thames below London Bridge, which it appears extend over 32,000 acres, and are under six distinct commissions of sewers."—Read 2°, and inserted as the first paragraph of the Report.

The 1st and 2d paragraphs of the Chairman's proposed Report were read 2°, agreed to, and added to the Report.

The 3rd paragraph read. Question, "That this paragraph stand part of the Report," put, and negatived.

The following paragraph (Mr. *Greene*) brought up, read 1° and 2°, agreed to, and added to the Report: "The Committee have inquired more particularly into the state of the marshes adjoining the Royal Arsenal at Woolwich, which they had reason to believe gave a fair representation of the state of the other marshes."

The following paragraph (Mr. *Vansittart*) brought up, read 1° and 2°, agreed to, and added to the Report: "It appears, also, that in the neighbourhood of Woolwich and Charlton many houses have been built, and are building, whose drainage empties itself into the marsh ditches; this seems to Your Committee a new source of miasma of dangerous character, and one likely to increase."

The following paragraph (Mr. *Greene*) brought up, read 1° and 2°, agreed to, and added to the Report: "To remove such evils is an object obviously deserving the attention not merely of the landowners and residents in the district, but of the Legislature; and it is most satisfactory to find, from the evidence before Your Committee, that there is good reason to believe that the increased value given to the lands by improved drainage would be such as amply to remunerate the proprietors for the necessary cost attending such works."

Paragraphs

Paragraphs 4 and 5 of the Chairman's proposed Report read 2°, agreed to, and added to the Report.

The following paragraphs (Mr. *MacGregor*) brought up, read 1° and 2°, agreed to, and added to the Report: "It appears, however, that any plan of effective drainage would require an amount to be expended in a single year, which, in justice to all interests, should be raised by loan, and repaid by annual instalments spread over a period of years."

"In order to carry out the improvements which the Committee consider to be indispensable, it will be necessary to provide some means for ascertaining the due proportion of interests in the lands to be dealt with, which shall be sufficient to bind the minority. The Committee suggest that the poor's rate assessment offers, at the present time, the best criterion for ascertaining the proportionate interests."

Last paragraph of the Chairman's proposed Report read 2°.—Amendment proposed (Sir *John Shelley*), line 2, after the word "them" to insert the words, "especially by having equal control over the private ditches as over the public sluices and sewers."—Question put, "That those words be there inserted." Committee divided:

Ayes.	Noes.
Lord Dudley Stuart.	Mr. Cubitt.
Sir John Shelley.	Mr. Wilkinson.
	Mr. Vansittart.
	Mr. MacGregor.
	Mr. Greene.
	Colonel Dunne.

Paragraph amended, agreed to as amended, and added to the Report:

Ordered, That this Report, together with the Minutes of Evidence, be the Report to the House.

To Report.

EXPENSES OF WITNESSES.

NAME of WITNESS.	Profession or Condition.	From whence Summoned.	Number of Days absent from Home, under Orders of Committee.	Expenses of Journey to London and back.	Allowance during absence from Home.	TOTAL Expenses allowed to Witness.
				£. s. d.	£. s. d.	£. s. d.
Richard Heath - -	Surgeon - -	Stanford-le-Hope, Essex -	1	- 10 6	2 2 -	2 12 6
J. Manley - -	Surgeon - -	Barking - - - -	1	- -	- -	1 1 -
					£.	3 13 6

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Veneris, 30° *die Junii*, 1854.

MEMBERS PRESENT.

Sir Edmund Filmer	Lord Dudley Stuart.
Sir John Shelley.	Mr. Alderman Cubitt.
Mr. Thomas Greene.	Mr. James MacGregor.
Mr. Wilkinson.	Mr. Masters Smith.
Mr. Vansittart.	Colonel Dunne.

SIR EDMUND FILMER, BART., IN THE CHAIR.

Peter Bossey, Esq., called in; and Examined.

1. *Chairman.*] YOU are a Medical Practitioner, residing at Woolwich, I believe?—I am a Fellow of the College of Surgeons, residing at Woolwich.

2. Have you resided there many years?—During all my life. I have been in practice there for 30 years.

3. I believe you are fully acquainted with the nature of the country, and of the surrounding neighbourhood, both medically and otherwise?—I have paid some attention to the state both of the town and of its immediate vicinity.

4. Do you know the marshes at Woolwich and Plumstead?—I am quite conversant with them. If you will allow me to present you with this map—(*handing in the same*)—you will see that the town of Woolwich is situated on the south side of the Thames, on a little projecting spur from Shooter's Hill, and it is bordered on either side by marshes; on the west side by a small amount of marsh, the Charlton Marshes, between Woolwich and Greenwich; on the east side by a larger tract, and on the opposite side of the river by the Essex Marshes. The map shows the division into the eastern and western district. The town of Woolwich is divided into the eastern district and the western district; it is so divided by the registrar, and consequently it will be convenient for me, in speaking of diseases and mortality, to refer to the two districts; the eastern district is exposed to the malaria of the marshes, the western district is nearly exempt from it; the mortality of the eastern district is kept very accurately by the registrar-general, and consequently I have certain data to show the influence of malaria upon it.

5. Mr. *Greene.*] Did not you say that the marsh on the east side was the largest?—Yes; the marshes on the east side form a considerable tract, bordering the river; I am not able to speak definitely as to the extent of them, but there is a general impression that they are about four miles in length between Woolwich and Erith, and a varying breadth from three-quarters of a mile to a mile and a half between the hills and the river.

6. Sir *J. Shelley.*] Are these marshes constantly under water, or is there more water upon them at certain times than at others?—They are not constantly under water; they are occasionally flooded.

7. *Chairman.*] I believe the intensity and extent of the diffusion of the malaria would be with regard to the manner in which those marshes are flooded with water?—The flooding of the marshes is generally followed by an increase of malaria, when the water has evaporated. The marshes are in a wet condition,

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especially in the autumn and winter of the year. In the spring and summer the evaporation goes on. But there are several sources of this wet condition, which it may possibly interest the Committee to know. The first which I would mention, is the leakage or infiltration from the river itself; the marshes are below the level of the river in that district; consequently there is a leakage through or under the banks. This is evident by what is observed in superficial wells, which are sunk in the marshes for some distance inland; the water in some of these wells will rise and fall according to the ebb and flow of the tide. The amount of this rise and fall in a well recently sunk in the Royal Arsenal, at 250 yards from the river, has been determined by Mr. Senday, the clerk of the works, to be two feet and two inches every tide, and two inches more in the spring tides. Another source of the moisture of the marshes is the land springs, which are particularly abundant.

8. Do you know, of your own knowledge, that the drainage of these marshes is defective?—Yes.

9. Do you know that from that defective drainage there is an accumulation of rank and decaying vegetation?—Yes; I have seen it lately being cleansed from the ditches.

10. Colonel *Dunne*.] Are you able to give the difference of the sanity of the towns of Woolwich and Erith, compared with that of Chatham, or towns within a small distance; for instance, Sydenham or Croydon?—I am not

11. Is there a great amount of ague and intermittent fever in Woolwich?—There is unquestionably a greater amount of fever and ague in Woolwich and its neighbourhood than in Chatham. It is difficult to acquire a knowledge of the exact degree of their prevalence beyond one's own observation; I simply state, that in Woolwich and its neighbourhood, owing to the wetness of the marshes and their deficient drainage, by the accumulation of rank and decaying vegetation there is a malaria produced; and I was about to connect my observations respecting the wetness of the marshes with this fact also, that there is an excess of moisture which is also detrimental to health.

12. What is the population of Woolwich?—The population of Woolwich, according to the census of 1851, was 32,069.

13. Are there any public hospitals where registers of diseases or of applications for medical assistance are kept?—Yes, there are several hospitals.

14. Can you give a statement of the cases of fever and ague amongst that population?—Yes; the total number of cases of ague occurring in the population of Woolwich would be obtained with great difficulty; many cure themselves, many come to the London hospitals and get cured, and their illness is unknown to the medical men of the district. In the public establishments to which you refer there are opportunities of testing the prevalence of ague and its intensity; I have had charge, as surgeon, of the convict establishments at Woolwich, in which we were accustomed to receive hundreds of prisoners every year; those were persons imported into the district, and if they became affected by ague, it would show that the district itself created the disease. I have a statement which I have prepared with some care, of the cases of ague which occurred amongst the convicts at Woolwich Arsenal in the years 1845, 1846 and 1847; in the year 1845 the average number of men was 430, the cases of ague treated were 57; in 1846 the average number of men was 412, the cases of ague treated were 196; in 1847 the average number of men was 420, and the cases of ague treated were 405.

15. Have you any information since that time?—I left the establishment at that time, consequently I have no official returns.

16. Are you able to state whether the same proportion was observable amongst the artificers and the military who were in the Arsenal and with whom the convicts worked?—There was not the same proportion, for this reason, the artificers and the artillery are less exposed to the malaria than the convicts; the convicts live in it night and day, their hulks being situated on the bank of the river close to the marsh, whereas the exposure of the artisans was only during the hours of labour in the Arsenal, after which they went away to their own dwellings in the town of Woolwich, which were more distant from the marshes.

17. Mr. *M. Smith*.] Or on the higher ground of Plumstead?—Yes; I can state the proportion of ague occurring amongst the artisans in the Arsenal in a particular season, in the carriage department in the Royal Arsenal; this statement is prepared by myself from careful inquiry and examination of the books;

books; the carriage department is a sort of enclosure, and the workshops are situated about three-quarters of a mile from the marsh; the artisans therein employed are healthy men in the prime of life; most of them reside in that part of Plumstead near to Woolwich, and the exposure of those persons to malaria is less direct than that of the prisoners to whose cases I have just referred; yet for the year 1848 and the year 1849, 112 cases of ague and relapse are registered amongst 402 workmen; it approaches very nearly to the proportion of 28 per cent.

18. Colonel *Dunne*.] Do you know anything of the sanitary condition of any of the towns in the neighbourhood of Woolwich, which are out of the influence of those marshes, so as to compare the sanitary condition of the two places?—I do.

19. Can you make any statement upon that subject?—I am quite satisfied that there is a very large amount of sickness at Woolwich, and that the mortality of Woolwich, particularly East Woolwich, is much higher than the average.

20. Mr. *M. Smith*.] Do you attribute that to the malaria which arises from the marshes above East Woolwich?—I do.

21. Do you believe that might be cured by a more efficient system of drainage?—There is no question that it might in a great degree.

22. Sir *J. Shelley*.] Do you find that illness increases as the water goes off these marshes after a flood; that the spring, when the malaria arises from the water going off, and the land drying, is the time when there is most disease, or is it when the land is flooded?—After the flooding is over, not when the land is flooded.

23. Supposing any scheme could be devised which would drain the marshes quicker, would it not shorten the period when the malaria is increasing?—Yes, and prevent the deposit of decaying vegetation.

24. Inasmuch as the object of all drainage is quick drainage, do you conceive that the effect of it would be to shorten the period when disease increases in that neighbourhood?—Effective drainage would lessen the amount of disease, I am confident.

25. Mr. *J. MacGregor*.] When you spoke of the marshes being flooded, did you mean to convey to the Committee that they are covered with water?—In winter time, partially.

26. Not the whole of the marshes?—No, not the whole of the marshes. Last winter I remember seeing the marshes opposite the Thames under water for a very considerable tract; the marshes on the south side were in places covered, but at that time there had been a continuous heavy rain.

27. *Chairman*.] By the south side do you mean the Kent side?—Yes; the south side is not generally flooded, because it is a sandy loam, there is loam on the surface; the marshes consist of loam on the surface, then there is sand overlying the chalk.

28. Mr. *M. Smith*.] Do you mean that the water of the river comes down below the wall, or that the marshes are flooded from the land-spring water?—From the upland water coming down, not from the river.

29. You speak of two causes, leakage from the banks or under the banks, or through the sluices and land-springs from above?—The leakage through or beneath the banks would offer an impediment to the running away of the water which comes down from above; it would keep the land in a wet condition, and so oblige the water to flow over the surface, or in the ditches.

30. Does the water in the Thames occasionally flow over the sea-wall, and through the banks?—I have heard that it did formerly.

31. Sir *J. Shelley*.] Are the storm waters dammed back by the embankment?—Yes, there is, I believe, but one sluice so low in the marsh wall that the water can run away at any other time than at low water; they are only partially flooded on our side; if they are not covered, probably the ditches are full, and the land is wet; on the other side I have seen it flooded, but it is not the ordinary condition of the marshes. With respect to the mortality of the eastern district of Woolwich, I should be anxious to impress upon the minds of the Committee that I have solid data for saying that the mortality of the eastern district of Woolwich is higher than it should be.

32. Colonel *Dunne*.] Can you compare it with the mortality of the western district?—We cannot, because the western district registration is imperfect; it has been badly kept; but we can compare it with the registrar's statement and

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publications, which are authenticated, which the registrar himself publishes. In the Woolwich Arsenal district, in 1843, the deaths were in this proportion, 28 per thousand, or 1 death to 35 persons; again, in 1849, he published another statement, and the deaths in the arsenal district are still 28 per thousand, or 1 in 35 persons. Now he also published, in 1843, a comparative statement, which forms very important datum for comparison; it gives the average mortality of the sub-districts, and it gives the proportion of deaths as 24 per thousand, whereas the proportion in East Woolwich is 28 per thousand, so that 4 died per thousand in East Woolwich beyond what the registrar-general takes as the average of the sub-districts.

33. Mr. *M. Smith.*] You not only state that it is a high rate of mortality, but higher than it ought to be?—Very much higher; the registrar-general gives the average rate of the healthiest sub-district (he gives Lewisham as one of the healthiest districts), where there are 18 deaths per thousand, or 1 death to 56 persons. Of the most unhealthy and low districts, the highest average the registrar general gives is 29 per thousand, or 1 death in 33; the mortality in East Woolwich is 28 per thousand.

34. Mr. *J. MacGregor.*] Does the population of East Woolwich include many of the public servants?—It includes a portion of the convicts and the garrison, and most of the artisans in the Arsenal; it does not include most of the artisans in the dockyard nor the marine barracks, because they live in other parts of the town.

35. Colonel *Dunne.*] Does it include the garrison in the barracks on the hill?—I think the mortality of the garrison is included, because the hospital returns are in the Arsenal district.

36. The garrison, as you are aware, is divided into the barracks on the hill and some lower down. You are aware, for instance, that the engineers' barrack is half-way down the hill; are those included?—The engineers are included; I believe the artillery are included; the marines and all the dockyard district are certainly not included.

37. Mr. *J. MacGregor.*] Is there not a constant accession of young and healthy men to that district who are brought there in the public service?—Yes.

38. Colonel *Dunne.*] Are not the artillery changed very frequently?—Yes.

39. The artificers and the convicts, to a certain degree, are changed; does not that make it a floating population?—Yes.

40. So that, in fact, the mortality which you mention would be much higher when those considerations are taken into account?—Yes; especially when it is considered that they are young persons in the prime of life, and generally in good health when they are brought into the place; they are not aged persons, for we get rid of a large proportion of our aged people and artisans, because when they are pensioned off they commonly go back to the country whence they came, to their friends and relations.

41. *Chairman.*] I apprehend those who come to Woolwich as soldiers, and so on, are passed by the surgeons as healthy persons before they come; is it the same with the artisans?—Every artificer in a public department, I believe, is examined as to his fitness for the public service, and as to the state of his health at the time of his entry.

42. So that you may say they come in a state of good health?—Yes.

43. Colonel *Dunne.*] Is intermittent fever included under ague?—Ague is intermittent fever; ague and intermittent fever are synonymous terms; but remittent fever is a form of malarious disease as necessarily due to malaria as ague is.

44. Would you classify them under the same head?—No; I should keep ague distinct from remittent fever.

45. They are both attributable to malaria?—Yes; but not the same malaria, because in the spring of the year we get a distinct and well-formed ague; but in the autumn of the year, from the same cause, we get attacks of remittent fever, which terminate in ague. The first five or six days it would be remittent fever, and as it gets better, as the malarious influence is thrown off, it becomes ague.

46. *Chairman.*] Have you turned your attention at all to the subject of the extent of area which is affected by malaria?—It exercises an influence over a very large extent; I am fully satisfied from personal observation, because I have

have seen ague and remittent fever in the hills, as well as in the valleys, as far as Woolwich Common and Shooter's Hill; I know it prevails even beyond those places. I have the registrar-general's return to show that it influences London; for he reports in the course of a year deaths from ague, as well as deaths from remittent fevers.

47. Sir *J. Shelley.*] Does that apply to the east side of the metropolis, or to London generally?—It is a summary of the London returns of mortality for 12 years.

48. It includes cases of ague in other parts of London, which may arise from other causes besides these marshes?—Yes.

49. *Chairman.*] Have you observed whether in places where you have practised, and where there has been better drainage, ague and remittent fever have disappeared proportionably from the outside of the circles?—My professional practice has been confined to Woolwich and its vicinity; I have lived there all my life. I cannot give positive data with reference to other places, but with reference to the extent of its prevalence in and among the population, I can state that it varies in different seasons; that sometimes we have ague confined to Plumstead, and just the immediate vicinity of Plumstead, but now and then it becomes epidemic, and prevails over the whole of the town. In some seasons we get only cases of ague of the men in Woolwich who are employed in the arsenal and exposed to the malaria, but in other seasons the wives who dwell at houses in the town of Woolwich, and even children at the breast, become affected by it.

50. Sir *J. Shelley.*] Have you taken any note as to the peculiar state of the marshes at those times, when these different forms of disease have appeared?—Yes; malaria varies in intensity; it is, perhaps, most intense in the morning and in the summer season, after there has been a great evaporation going on under a hot sun. In the early mornings, at three or four o'clock, a little fog arises upon the marsh, perhaps not above three feet high, which is exceedingly offensive upon going into it; I have taken a very severe remittent fever and ague from passing through that fog; persons who are out early in the morning in the marshes, before the fog is dissipated, suffer very much from ague, whilst others who live upon the hill and are above the fog, suffer considerably less.

51. That fog does not occur when there is a large quantity of water upon the land, but generally in the summer, when there is least?—Yes, in the summer.

52. Mr. *Greene.*] You have described a different state of the marshes when persons were variously affected; can you explain to the Committee what you have observed to be the state of the atmosphere, and the state of the marshes at such different periods?—There has been a dry state of the atmosphere.

53. At the times when you said that the women and children were equally affected with those working close to the marshes, have you observed any peculiarity either in the state of the marsh or in the state of the atmosphere, which could account for that difference?—The peculiarity in the marsh which had given rise or added a good deal to the epidemics of 1845, 1846, and 1847, was this: the owners of the marshes, or the persons who used them, had dammed up many of the ditches, so that the ditches were for a long time in a very unclean state.

54. What was the effect produced at that very time?—It was followed by a very great extension of ague and intermittent fever.

55. Was that the period to which you particularly adverted when you spoke of the time when the women and children were affected as well as the men?—It was. Some horses in the marshes had been affected with what is called the staggers, and it was supposed to have been produced by their drinking salt water. Some of the sluices in the marsh banks are so high that they only admit the water at half-tide, consequently it comes in in a very brackish state. The graziers, to avoid this, increased the number of pens in the marshes and kept the upland water, so that the cattle could drink nothing but fresh water.

56. Mr. *M. Smith.*] Are the Committee to understand that in the year 1854, salt water is admitted into the marshes?—As I mentioned, there were several sluices, and the reason assigned for penning up those sluices was, that the horses became affected with the salt water which was then admitted, but I believe afterwards the graziers who occupied the upper marshes had them dammed up, and so prevented the escape of the water; they increased the quantity of

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vegetation and the foulness of the ditches; the result was, that malaria prevailed and affected the whole town and neighbourhood very seriously.

57. Does that damming up exist now?—I do not know whether it exists; I think of late there has been considerable attention given to the marshes, and there has been considerable cleansing of the marshes.

58. Are you able to specify any change in the healthiness of the place which is consequent upon any change with regard to damming up the water?—There has been less ague this season than in previous seasons.

59. Can you say that the water is less dammed up this season than it was in previous years?—I am not aware.

60. Mr. *J. MacGregor.*] Is it not the case that at this day any gentleman who would take the trouble to go down amongst these marshes would find the atmosphere in a most offensive state?—Yes. I lately had occasion to go to see a patient in a cottage at the head of the first manor way from Woolwich, and I found a number of convicts cleansing out a ditch and laying the vegetation which they threw out on the side of the bank, and it was very offensive. When I got into the house I found it was to attend a case of ague of a woman residing there upon the marshes.

61. Sir *J. Shelley.*] Had any quicklime been put to the deposit that was taken out of the ditch?—No.

62. Under whose orders was that ditch cleansed by the convicts?—I think it was bordering the Ordnance ground, and no doubt it was done for the sake of cleansing the ditch.

63. You think it was done by order of the Ordnance Department?—Yes.

64. Colonel *Dunne.*] Most likely it was necessary?—Yes; it was done as a means of cleansing the ditch.

65. Sir *J. Shelley.* You state that you found the ditch being cleansed by convicts, probably under the orders of the Ordnance Office, but that none of the usual means of preventing malaria, by mixing quicklime with the mud, was being used?—I only say that it was removed from the ditch and spread upon the surface of the ground.

66. Colonel *Dunne.*] Did you ever hear of chemical preparations or lime being added to marsh mud?—No.

67. Mr. *J. MacGregor.*] Even when the ditches are not disturbed by being cleansed, is it not the case on a hot day that there is a foul smell from the rank vegetation?—I am familiar with it, and can always detect it.

68. Are you able to detect it when the ditches are not being cleansed?—Yes; there is always in the marshes an offensive smell.

69. Mr. *Wilkinson.*] You have been all your life at Woolwich, you say?—Yes.

70. Have you observed any difference of late years in the sanitary condition of Woolwich; has it improved or gone back?—Upon the whole, the sanitary condition of the town has rather degenerated; there has been an increase of fever, and an increase of ague.

71. Has there been any material alteration in the state of the marshes within the time of your recollection?—I mentioned a fact just now, that about the years 1845 and 1846 there was an increase of decaying vegetation from the damming up of the ditches.

72. Has the state of the marshes been better or worse of late years?—I believe some have been drained by the proprietors themselves.

73. Notwithstanding that drainage and improvement, you say that the general state of health in Woolwich has deteriorated?—Yes; the registrar-general's return distinctly proves that it has not bettered, because the proportion is the same in 1851 to what it was in 1841, that is, 28 per 1,000. The description of ague from which people suffer in the neighbourhood is very distressing, and produces many complications of diseases.

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74. *Chairman.*] WHERE do you reside?—I live now on Woolwich Common, at No. 6, Nightingale-place. I lived in the hospital up to within the last two months, but now that the departments are amalgamated, I am no longer living there.

75. How

75. How many years were you a surgeon at Woolwich?—I was upwards of 46 altogether in the department, in different ranks.

76. Colonel *Dunne.*] Did you belong to the Ordnance Department?—I was Inspector-general of the Ordnance Medical Department; but now that the two departments of the army are amalgamated, I am no longer in full pay; I have retired.

77. *Chairman.*] How long were you in that service?—I was in the service between 46 and 47 years.

78. Mr. *J. MacGregor.*] What length of time were you in the public service at Woolwich?—I have been occasionally at Woolwich all my life; but I have been about 18 years abroad in various countries, the Ionian Islands, the West Indies, Gibraltar, and other places.

79. *Chairman.*] Has your attention been called to the marshes near Woolwich, and the malaria which is supposed to be consequent from those marshes?—Yes; my attention has been called to that subject, because I have had to treat cases of fever which have come from those marshes.

80. Will you state to the Committee the result of your experience?—There is a guard at Woolwich which mounts about 50 or 60 strong; that guard goes down to the arsenal and there remains for 24 hours, and the men mount sentry all round the arsenal, particularly the East Wharf guard, which lies very near the marshes, and that guard is more unhealthy than any other; it is, I may say, in the very centre of the malaria; I think we get most of our cases of ague and of remittent fevers from that guard.

81. Colonel *Dunne.*] Do you think you have more fever in Woolwich than in other stations in England in which the artillery and the engineers are employed?—We have some stations in England where there is no ague at all, and no fever particularly. If you go abroad to some of the Canada stations, we have no fevers all the year round.

82. In Woolwich you think that that fever is caused by the malaria arising from the marshes?—I think so. I think the various forms, not only of fevers, but many other diseases, are the consequence of malaria.

83. You are well acquainted, are you not, with fever, ague, and intermittent fevers in foreign countries, and their forms are familiar to you?—I have been treating them all my life, and my attention has been turned to the causes of them.

84. You have no doubt of the cause of these diseases in this instance?—None whatever.

85. Do you find any difference between the health of the men at the engineers' barracks on the hill and of those in the arsenal, who are more exposed to malaria?—We have no barracks in the arsenal, but simply the guard which I have mentioned. The guard there were exposed to night duty, and we had more cases of ague coming from that guard. The horse artillerymen never mount guard, except their barrack guard and stables; still they have occasionally agues; but we think they get them from standing about after heating themselves with rubbing down their horses; they stand at the door of the stable to cool themselves.

86. You find the proportion of ague amongst the horse artillery less than amongst the foot artillery, who mount guard below?—I think we do.

87. And you find agues more prevalent in the engineer's barracks, where they are more exposed to it, in proportion to their number, than the artillery are?—I do not think they are; I do not think they have many men on night duty.

88. Do you consider that exposure to night malaria is one of the great causes of ague?—I think so.

89. Mr. *Greene.*] Can you compare the night guards at Woolwich with the night guards at any other place?—Many of our stations are very malarious stations; it is not very easy to get a station which is not so affected.

90. Do you know with reference to the army at large, whether there is any degree of difference in the liability to ague amongst the soldiers in the different stations, who are exposed as night guards?—I have no doubt that there is a very great difference in stations, but I cannot give any data.

91. Colonel *Dunne.*] You have been at Santa Maura, have you not?—I have been there.

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92. Are you aware that the sentry boxes for the guards at night are obliged to have glass windows to protect the men from the malaria?—I know that it is a most malarious quarter.

93. Sir *J. Shelley.*] Do you find that the disease which you say is particularly prevalent close to the marshes, spreads over the town of Woolwich and reaches to the higher portions of the town?—It does in a less degree.

94. Do you find that the tendency to disease exists in a greater degree when the wind blows from the marshes, than when it blows in a contrary direction? —Yes; with north winds and north-east winds, we find that ague prevails much more, and extends further than it does with the winds in a contrary direction.

95. Do you find that this disease increases during the time of the evaporation that takes place when a very wet season is followed by a very dry one; is that the time that you see most of the disease?—I think in the very hot weather which we had in 1825 and 1826, when the heat was almost tropical in this country during those years, the malaria spread much further than it has ever done before or since.

96. Any facilities which would quicken the drying of the marshes after a very wet time, would, in your opinion, tend to shorten the period at which the disease is generally most prevalent?—I think there is no doubt that it would tend to prevent the malaria spreading.

97. The Committee have been given to understand, that owing to some idea that the salt water had produced a disease amongst the horses turned on to those marshes, the occupiers of the marshes in some years have dammed up the ditches in the upper part of the marshes; can you state whether that was so? —I know from Serjeant Omerod, that lived on the marshes at the entrance near what we call the Marsh Gate, that for many years he found this damming taking place and the sluices not opened according to the regulation, as they ought to have been twice a week, and he exerted himself to have it done.

98. Were you attending the family at that time?—Not particularly; I dare say I may have attended them.

99. Do you know this from your own knowledge?—I know it to be the fact.

100. Are you aware of any improvement in the drainage at all which has taken place lately?—If you go back a great many years, I remember when the whole of those grounds were in grass; it was supposed that they could not grow corn there at that time. Since then I have seen the corn land increasing every year, consequently some drainage must have taken place.

101. Mr. *Greene.*] Is not the atmosphere which is affected with that malaria generally of a very weighty description?—I do not know how that could be proved; it is supposed that malarious air is very dense; there is no test for malaria, either mechanical or chemical.

102. In proportion as malaria is injurious in its effects, is it not heavier than ordinary atmospheric air?—You will perceive a fog generally lying over malarious land; there is a kind of haze that falls over the land, and when the sun touches it it rises; that is from the effects of the sun.

103. That might be an ordinary fog, but that which you describe has a deleterious or injurious effect, arising from the decomposition of vegetable matter and things of that sort, which are prejudicial; is not that malaria of a very weighty description, and not liable to rise to a very great height?—I believe that to be the case. It is supposed to rest upon the surface of the marsh, and a light air of wind will carry it. I think it can be proved almost, from what I know of certain localities, that malaria will be carried up the slope of a hill in that way; it is never known to descend again from the crest of the hill.

104. You think it will rise in an injurious manner, even up a hill?—It will; it will go up the slope of a hill. That is the way in which I account for the agues which happen on Sandy Hill and Plumstead Common. We have ague there; and I know from certain localities in the West Indies that malaria will be carried up the slope of a hill and never descend again.

105. Have you never visited a locality in which a valley was exceedingly liable to the influence of malaria, whereas the high ground was entirely exempt? —If you take a certain height the land is entirely exempt; still the malaria will travel up a slope. There is no question about that.

106. Mr.

106. Mr. *Vansittart.*] Will it travel a considerable height?—I am afraid to say anything exact upon that score; I dare say it will.

107. Mr. *M. Smith.*] Have you known cases in which the edges of rivers have not been subject to malaria, where the high grounds round have been subject to it?—Yes.

108. Colonel *Dunne.*] Is not the theory with respect to malaria very much disputed amongst physicians?— No doubt, but there are many facts which are perfectly indisputable.

109. Have you known at Santa Maura, Zante, and many other places, where the edge of the marsh was comparatively healthy while the higher places were very unhealthy?—Yes.

110. Mr. *J. MacGregor.*] Did you hear the evidence which was given by Mr. Bossey?—Yes.

111. He stated that the number of deaths at East Woolwich were in excess of the ordinary average, although at East Woolwich there is a constant importation of young and healthy men; do you attribute the increased mortality there to the state of the marshes, to a great extent?—Yes; I agreed with Mr. Bossey in almost everything he said, except about the cause of mortality not decreasing. I think there is one cause which he did not state, which is, that of late years houses have been built upon more unhealthy situations; every day further down towards the marshes in East Woolwich there are new erections, and they are built upon very unhealthy land. I think that that tends to increase the mortality.

112. Mr. *M. Smith.*] On the low ground near Plumstead?—Yes; they have gone to meet the marsh air; and I should say, that if the mortality is now greater, it is very much caused by the bad situations which have been chosen for the new houses.

113. *Chairman.*] You have mentioned in your evidence that the horse artillerymen, after cleaning their horses, stand about with their coats off, to cool themselves, and that that creates ague?—Yes.

114. Can you state that that would be the effect of the marshes; would it not rather be from checked perspiration?—No doubt it would be from both causes; I think that that practice would not engender the ague if there were no marshes; probably inflammatory disease would be caused by this exposure; I think both causes operate.

115. You would not put it entirely to the credit of the marshes?—I think, so far as the aguish part goes, it would; still we have a great many mixed diseases which begin like ague, but terminate very differently; those diseases, no doubt, would assume a different form if they were not produced by marsh air; many diseases are very difficult to treat, from being of a mixed character, beginning like marsh fever, and terminating like inflammatory fevers or diseases of the chest.

116. Mr. *Vansittart.*] You state that Woolwich is a decidedly unhealthy place for England?—Yes; the lower part of Woolwich is, perhaps, not a healthy place; I think the lower part of Woolwich is very unhealthy.

117. Do you consider the upper part of Woolwich healthy or unhealthy?—It gets better as you go up the hill; I think where the barracks are situated it is not unhealthy; both the marine barracks and the artillery barracks are well situated.

118. Do you attribute the unhealthiness of the lower part of Woolwich entirely to the prevalence of ague?—I think in a great degree the deaths are occasioned by the proximity to the marshes, and the lowness of the situation.

119. I believe the winter before last was very wet everywhere?—Yes, it was.

120. Was ague more prevalent last summer than the previous summer?—There was a good deal of ague, but I do not know that it was more prevalent; it varies every year more or less; it is more likely to be caused by an excessively hot season following a wet one than by a constantly wet season.

121. Supposing a hot season to follow a dry winter, so that the marshes were not very wet, do you think that that would be likely to give rise to ague?—I think you would have remittent fevers in a case of that kind; still there would be ague telling against the health of the population.

122. Do you think if the marshes were perfectly dry you would still have ague?—Not what we call intermittent fevers, but remittent fevers, which are much more fatal than ague.

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123. Mr. *J. Macgregor.*] Sandy Hill and Plumstead Common being a gravelly soil would be a healthy situation, I presume, if it were not for their proximity to the malaria?—Yes.

124. It is the malaria from the marshes which affects the health of persons residing on Sandy Hill and upon the dry gravelly parts of Plumstead Common?—No doubt the malaria is wafted up the hill.

125. Mr. *M. Smith.*] I suppose you think that ague would be lessened by a more efficient drainage?—No doubt. I should expect to see it disappear from many parts altogether. I think there is no ague known at Eltham; a hill intervenes.

126. Mr. *J. MacGregor.*] Are you of opinion that if the marshes were thoroughly drained Sandy Hill and Plumstead Common would then become very healthy situations, and that malaria would be removed by drainage, and those places would then in all probability become healthy?—I should expect so; and not only the places that the Honourable Member has mentioned, but the whole of East Woolwich would be generally benefited by it. I do not know that you could entirely get rid of the effects of malaria by drainage, but I think you would find a great improvement.

127. *Chairman.*] Have you had any experience of the effects produced by draining land; for instance, where there has been marsh land drained have you seen the good effects of that land being drained with regard to public health?—I know the good effects which have taken place in Lincolnshire from that very cause, and by my reading books.

George Farr, Esq., called in; and Examined.

G. Farr, Esq.

128. *Chairman.*] ARE you a Surgeon in the Ordnance Medical Department at Woolwich?—I am.

129. How long have you resided there?—I have been in the department 24 years, about 14½ of which I have spent abroad, and the remainder at Woolwich.

130. Has your attention been called to the question of malaria?—It has frequently, I may say, constantly, during the whole period of my doing duty at Woolwich.

131. Is it your opinion that the malaria which arises from the open ditches, and so on in the neighbourhood of Woolwich is injurious to public health?—Yes, very much so.

132. Can you state anything within your own knowledge in support of that opinion?—Yes; amongst the artillerymen who are usually admitted into the hospital at Woolwich, there is a great deal of intermittent fever, and some remittent fever; the former in the spring of the year and the latter towards the autumn. I have cases under my charge now of the same sort.

133. Has your attention been particularly called to the predisposing cause of those illnesses?—The predisposing cause no doubt is the malaria of the neighbourhood. I may state that for about three years I was surgeon of the Arsenal before 1846; I terminated that service in 1846, when I went abroad. I have only lately returned to England; but during that three years the cases of ague were very numerous indeed, and also diarrhœa arising from a similar cause. Rheumatism and tic doloureux is also common among the ladies who live in the Arsenal on the border of those marshes. Some cases I have known which were quite incurable till they left the place and got into a fresh atmosphere.

134. Colonel *Dunne.*] Can you state whether the persons who reside in the district are less susceptible of ague than those who come from a distance?—I cannot say; in the lower part of Plumstead ague has always been prevalent even amongst the inhabitants who are accustomed to reside there, more especially amongst the poor, who are perhaps ill clothed and ill fed; that may be one reason of its being more prevalent amongst them than the more wealthy.

135. *Chairman.*] In your official capacity has that come within your own observation?—Yes; constantly.

136. Have you attended any of those cases?—Yes.

137. Mr.

137. Mr. *M. Smith.*] Was the unhealthiness of the men occasioned by the malaria to a very considerable extent?—Yes.

138. Do you consider that the malaria arises from the inefficient state of the drainage of the marshes?—Yes; I have been very often obliged to recommend artisans for leave to go into the northern parts of England, to enable them to become convalescent.

139. Colonel *Dunne.*] Is it your opinion that the proportion of diseases, arising from malaria, is greater at that station than at any other station in Great Britain?—I never served at any other station, so that I cannot say from my own personal knowledge.

140. Mr. *M. Smith.*] You think that the public service is injured by the effects of this malaria?—Yes.

141. Colonel *Dunne.*] Is it not the case that at all foreign stations the troops are subject to malaria?—Not equally.

142. Mr. *Greene.*] At what foreign stations have you been?—Barbadoes, Canada, and Bermuda. I have gone through the West India Islands, but I have not been stationed there.

143. Mr. *M. Smith.*] Have you ever been at Corfu?—I have never been in the Mediterranean.

144. Colonel *Dunne.*] Is there not at some of the stations in Canada a great deal of ague?—In Upper Canada round the Lakes, particularly during the time of making the Rideau Canal, the men suffered very much from ague.

145. Mr. *M. Smith.*] Did not some of the officers die there?—Not many officers, but a great many men died, and contractors' labourers, in a very short period.

146. Sir *J. Shelley.*] Are you aware of any increase of disease, owing to any of the ditches on these marshes being cleansed?—No; I have not been long in the neighbourhood. I only lately returned from abroad; I have been away seven and a half years.

147. *Chairman.*] How long have you been at Woolwich in the Ordnance Department?—I have been upwards of 10 years stationed at Woolwich out of 24 years' service.

148. How many years have you observed these marshes?—From 1830 to the present whenever I have been stationed at Woolwich. I only returned during last winter from abroad. I left in 1846, and I have been abroad ever since.

149. You have not been at Woolwich since 1846 to the present time?—No; three years previously I was surgeon to the Arsenal.

150. Mr. *J. MacGregor.*] Do you now find the same character of diseases existing, and the same malarious affections prevailing at Woolwich, as you did when you left years ago?—Just the same; I have plenty of cases under my charge.

151. Which you attribute to the state of the marshes?—The state of the circumambient air which arises from these marshes more than any other ground.

152. Mr. *Greene.*] Do you suppose that there are more attacks of ague and other diseases incident to malaria at Woolwich than at any other quarter at which you have been posted?—I should say five-sixths more.

153. Where was the place which you conceive to have the greatest proportion next to Woolwich?—I should think it would be about the Lakes of Canada.

154. Was it the same description of disease, and were the same effects produced by the malaria as those which you find at Woolwich?—No; it was more violent, a more swiftly progressing disease; a remittent fever, very frequently terminating fatally in 20 hours.

155. You cannot compare the state of Woolwich with any other barracks in England?—No; I have never been anywhere else.

The Rev. *William Acworth*, called in; and Examined.

156. Mr. *J. MacGregor.*] HOW long have you been Vicar of Plumstead?—Rather more than a year.

157. Prior to that you resided in Leicestershire?—Yes.

 158. I believe

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158. I believe you were an active magistrate there?—Yes.

159. *Chairman.*] Whereabouts?—I had seven parishes under my charge. I resided at Rothley; it was a Peculiar, and the parishes were situated in different parts of the county of Leicester. I had three parishes very near to Melton Mowbray, but my residence was at Rothley.

160. Mr. *J. MacGregor.*] Will you state to the Committee what your observations have been of the district in which you now reside, with regard to the sanitary state of the population?—As soon as I came to Plumstead, of course, it was my duty to acquaint myself with the state of the schools, as well as of the population generally. I was struck by observing that there were hardly any children receiving instruction in the schools. On going to inquire of the parents why they were not at the school, many said they could not afford to send them. This led me to inquire as to the earnings of the parents. I discovered that a large proportion of the people were actually employed in the Government works, and were earning wages varying from 14 *s.* up to 2 *l.* and 2 *l.* 10 *s.* a week. I contrasted the earnings of those operatives with the state of the labouring population in Leicestershire, for in the parish in which I resided they were principally framework-knitters, who are usually in the lowest state of poverty. I fancy framework-knitters must be considerably below the general run of labourers and operatives throughout the whole kingdom; therefore I did not suppose that the small number of children originated from the incapacity of the parents to pay the small sum of 1 *d.* and 2 *d.* a week. On going to the houses of the parents, I discovered that a great many of them were sick. I had been hardly a month in the parish before I was obliged to send for a medical man, in consequence of one of my own children falling sick; and, one after the other, the whole of my children were attacked, and on sending for the medical man, he said, "the child has got remittent fever;" and this led me to institute inquiries throughout the whole parish; and on calling on Mr. Butler, an eminent surgeon of Woolwich, he said, "Why, I have known what it was to go from my house to yours," which is not half a mile, "and I have seen 60 patients labouring under ague. I have never mounted my horse from the time I left my house till I got to your house; that is now some years ago." On inquiry, I was told that the cutting of the railway had considerably improved the sanitary condition of the parish; still I was anxious to institute as much inquiry as possible as to its sanitary state. I applied to all the medical men of eminence, from the mouth of the Thames to London, whose names I could discover by reference to medical journals. I applied first of all to Dr. Paris, the President of the College of Physicians, and then to all the other medical men, and I found one uniform testimony, that the whole district of the Thames was exceedingly unhealthy. I should say that the situation of the vicarage was so unhealthy, that though I was anxious to maintain the character which a new incumbent ought to do, and live among my people, I went to the Bishop of London, and said, "My Lord, it is quite impossible to live in the vicarage."

161. Is the vicarage situated close to the marshes?—Yes.

162. I believe the persons resident at the vicarage have been afflicted with remittent fever?—Yes.

163. Do you attribute it to the undrained state of the marshes?—Yes.

164. During your visits to the houses of the people to procure information why the children abstained from coming to the school, did you ascertain that ague and remittent fever were prevalent diseases?—Yes.

165. And that a great proportion of the population was affected in that way?—Not so many during last year as in previous years. I had ascertained, on visiting the parties, that they were suffering from ague, and therefore unable to come to school; and also that the labourers in the Arsenal, which is in my parish, were often similarly affected.

166. You have no doubt that the suffering of the people is very considerable from the malarious atmosphere from the marshes?—Yes, no doubt. As soon as I got the permission of the Bishop of London to remove my family, I took them down to Ramsgate, and they instantly recovered. My children had been particularly healthy. I had more medical attention to my family during the three months I lived in the vicarage, than I had in my residence at Leicestershire, extending over a period of 16 years.

167. Where

167. Where did you go when you left the vicarage?—I have gone to the higher ground, where the health of my family has so improved, that they are all in the enjoyment of health. I have never had a medical attendant since. The evil affecting the population cannot possibly be told, because gentlemen have an impression that it is an unhealthy district, therefore they do not come to fix their residence there; if any gentlemen were to come to Plumstead, they would see some of the most delightful spots in the whole of the United Kingdom: but they do not come there, because there is a general impression of the unhealthiness of the district. Therefore a few friends met together to concert the best means of draining the marshes.

168. You are able to state, from your present residence in the district, and from your own observation, that there is great unhealthiness growing out of the malaria of which we have heard?—No doubt; if any gentleman will go into the school, he will at once be convinced of that, from the appearance of the children. I think it was Mr. Inspector Arnold who, when at my house a short time since, observed that the boys did not appear as healthy as in ordinary schools. I was examining a school about three weeks ago at Ardrossan, and although the children were barefoot, and the wages of their parents less than they are at Plumstead, yet the children in my parish looked emaciated compared with the children I refer to at Ardrossan, and likewise at the schools which were under my charge in Leicestershire.

169. Mr. *Vansittart.*] How far are you removed from the marshes now?—I have now removed half way between the marshes and the high grounds of Shooter's Hill.

170. How far off the marshes was the vicarage?—The vicarage was close to the marshes; my present residence is about half a mile from them.

171. You find your children perfectly healthy now?—Hitherto I have found them perfectly healthy; we have a fine gravel bed upon which the house stands.

172. Is there much ague at the present time, or other diseases, prevailing at Plumstead?—I do not think there is; my acquaintance with Plumstead only extends over 15 months.

173. Was there much ague last year, when you first came, prevailing at Plumstead, amongst the people?—I am not able to say, except that when visiting the parents' houses, to ascertain why the children were not at school, I often discovered that they were laid up with ague.

174. There was a considerable proportion of ague at that time in the place?—No doubt; I went to the railway station at Abbey Wood, to inquire why the children did not come to school; I asked the man if he had suffered from ague; he said he had. I sent my clerk to Picardy, where it was discovered that during the last year one-sixth of the population had been laid up with ague.

175. Mr. *Wilkinson.*] I think you said there was a meeting of the inhabitants, to ascertain whether the marshes could not be thoroughly drained, but you did not give any result to which that meeting came?—It was not a meeting of the inhabitants; there was a meeting held of gentlemen who might be supposed to be interested in this matter, both in a sanitary and agricultural point of view; we invited as many persons to attend as we thought were interested in the matter, and there was but one general impression felt, namely, that it was most desirable, both in a sanitary and agricultural point of view, that the drainage should be carried out; but there were difficulties in carrying it out by the Commissioners, which exist under an old Act of Henry the Eighth, which crippled the powers of the Commissioners for the accomplishment of the purpose. The clerks of the Commissioners all stated that it was of supreme importance, both in a sanitary and agricultural point of view, for the whole of the district; but the powers of the Act of Parliament would not enable them to accomplish it.

176. Sir *J. Shelley.*] Are the expenses of that commission paid by scot or by rate?—Principally by scot.

177. Extending over the marshes?—Extending not only over that district, but as far as Tunbridge.

178. Mr. *Wilkinson.*] I presume what you mean to state is, that there were certain circumstances which interfered with the practicability of draining these marshes as a matter of private enterprise?—Yes; it requires that three-fourths of the occupiers shall consent; the occupiers are already taxed rather heavily, and it was feared that a tax would be heavy when added to what is called

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the scot, for keeping up the wall; therefore it was doubted whether the consent of three-fourths could be obtained.

179. Sir *J. Shelley.*] Did any gentleman engaged in agriculture make such a statement as that the expense of the drainage would not be met by the improvement of the land?—A large agriculturist who farmed a large portion of land, whether as tenant or owner, I do not know, felt that it would be repaid; but some others doubted it. One or two persons differed at the meeting at Dartford, and rather objected to the scheme.

180. Am I to understand you to say, that three-fourths are necessary of the agriculturists, who are occupiers of land, and that it was doubtful whether three-fourths would agree to a perfect system of drainage?—Yes.

181. Mr. *Wilkinson.*] Do you mean to convey to the Committee, that if three-fourths had consented, it could have been accomplished even in the existing state of things?—If three-fourths had consented, then the drainage could have been accomplished.

182. Mr. *J. MacGregor.*] You are speaking of that from what you have heard, rather than from an actual knowledge of the state of the law?—I merely refer to the meeting which took place at Dartford.

183. Mr. *Vansittart.*] Were you resident at Plumstead last summer or autumn?—I could hardly be said to be resident, because my children were in such bad health that I got permission from the Bishop of London to leave the Vicarage House; and, till I could find another, I took my family to Ramsgate; they were there from October to January; I came back myself.

184. During the time you were at Plumstead am I to understand that, comparing the state of the population at Plumstead with Leicestershire, where you were before that, there was a considerably larger amount of disease prevailing?—That was my impression, decidedly.

185. Is that your experience founded upon observation?—I never calculated upon bringing out this evidence in any way whatever; sometimes I daily went visiting among the people; some weeks I was not able to go at all, therefore I kept no return of the illness in either Leicestershire or Plumstead.

186. From your experience, have you the slightest doubt that there is a larger amount of disease in the town of Plumstead than in the Leicestershire district?—I have no doubt of it.

187. Also you have no doubt that the wages of the people of Plumstead were much higher than those of the people in Leicestershire?—I have no doubt upon the subject, and the comfort of the people is not equal to that of the people of Leicestershire upon smaller wages.

188. Have you any doubt that this disease is owing to malaria?—Not the slightest in the world.

189. Mr. *J. MacGregor.*] Have you any doubt that if the marshes were drained, the evil effects of the malaria would be abated?—I have no doubt that Plumstead would be as healthy as any place in England; we are upon a very fine gravel bed, which supplies London to a great extent with gravel, and the shipping with ballast; we have a fine deep stratum of gravel, extending to the depth of 40 or 50 feet probably; my own house is upon a bed of gravel, and I think it would be particularly healthy if it were not for the influence of the malaria which is occasionally coming up from the marshes. Captain Hutchinson, who is in the Cadet Academy, dined with me yesterday; I find he has removed his family to Barnet at great personal inconvenience to himself; his wife was obliged to be removed this very week to Barnet.

190. Mr. *Vansittart.*] I understand from what you have just said that your residence is not in the marshes?—No; the vicarage is in the marshes, but I am now living on the high ground.

Mr. *William Dickson,* called in; and Examined.

Mr. *W. Dickson.*

191. *Chairman.*] WHAT are you by profession?—A Farmer and Land Agent.

192. Where do you reside?—At East Wyckham, near Welling, in Kent.

193. How long have you resided there?—Next Michaelmas I shall have been 22 years in that vicinity.

194. Has your attention been called very much to the state of the marshes in the neighbourhood?—I occupy marsh land.

195. How much marsh land do you hold?—Sixty-two acres.

196. Have

196. Have you any reason to suppose that the marsh land might be improved by drainage?—Yes; I have every reason to suppose so; I know it from the facts, because I am very much injured.

197. Sir *J. Shelley.*] Is the marsh land which you occupy, under the plough, or under grass?—Part is under the plough, and part under grass.

198. And the land is subject to the water being penned up?—The water is penned up too high sometimes; even now the water is going back in the furrows on the meadow land.

199. Is there any drainage at all upon your land?—We cannot drain because there is no outfall.

200. Taking the cultivated land, what do you calculate the damage to be to a crop of wheat, per acre?—Taking it at the lowest, it is a quarter of wheat an acre, per annum.

201. Do you mow any grass land?—Yes.

202. What is your calculation of your loss, first of all, with respect to the quantity of hay?—I think upon the average it would be from half a load to three-quarters, an acre; a load contains 18 cwt.; that would make it 9 cwt.

203. As a practical farmer, will you tell the Committee what is your calculation of the loss in the quality of the hay, per acre?—That depends so much upon the seasons.

204. What would be the value of hay grown upon thoroughly drained land, and the value of hay grown upon wet land?—The quality of the grass would be as good again.

205. Mr. *Vansittart.*] You do not mean that it would sell at twice the sum?—No; there would be twice the virtue in the grass; both the quality and the quantity would be increased.

206. Sir *J. Shelley.*] Supposing you grow a ton of hay to the acre, what do you consider as the deterioration in the value of that ton of hay owing to its being grown upon wet land instead of dry land?—If hay was grown upon dry land, I should say that where you sold one load for 3*l.* or 4*l.* you would get 5*l.* for the other.

207. Mr. *Vansittart.*] In fact, you think there is a deterioration of 1*l.* and even 2*l.* a load?—Yes.

208. Mr. *Greene.*] What is the distance of the marsh land which you occupy from your own residence?—About a mile and a quarter.

209. I presume you are out of the marshes?—We are out of the marshes, on the uplands.

210. Your land drains down into the marshes?—The railway divides it near Plumstead church.

211. Sir. *J. Shelley.*] Have you any land under the plough at Welling?—Yes, I have 547 acres.

212. What is the average quantity of wheat to the acre which you grow at Welling?—About four quarters to the acre.

213. What average quantity do you grow upon the marsh land which is under the plough?—From three to four quarters.

214. Do you find, in selling that wheat, any difference in the price which you obtain for the wheat grown on the marsh land and the wheat grown upon the upland?—I get a better price for the upland wheat than for the wheat from the marsh.

215. Therefore the Committee are to understand that you grow on the upland a quarter to the acre more wheat on the average, and that you get more money for the upland wheat than you do for the marsh land wheat?—Yes.

216. Mr. *Greene.*] Supposing the marsh land to be laid dry, do you suppose that you would have a soil of a deeper and better quality than that which you have up at Welling?—I do.

217. Mr. *Vansittart.*] Have you any doubt about it?—No; I am satisfied that I could get five quarters to the acre upon the marsh land, if it were laid dry.

218. Have you any land at all that is drained?—I have a great deal drained.

219. Of the same description as the marsh land?—Not marsh land.

220. Do you know of any marsh land in your neighbourhood which has been drained?—Yes.

221. Has the draining of that land produced the effects which you have just stated?—Yes.

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222. Whose land is it of which you are speaking?—Mr. George Russell occupies it.

223. Sir *J. Shelley.*] Does he grow a load to the acre?—Very often.

224. *Chairman.*] Was it land in the same condition as your marsh land now is which is not drained?—It was better situated than mine, because he was below me.

225. Was the staple of the land better?—The staple of the land is the same.

226. Is the staple of all the marsh land the same?—The staple of the marshes is not all the same; the land of the lower level, next to Erith, is of a thinner nature. There was not so much deposit left by the river, because it lies near to the river, and when the river left it, it washed it off.

227. Can you state, from your own experience, that the same description of land, from being drained, has produced the effects which you have stated?—I have seen it.

228. Sir *J. Shelley.*] Do you use lime as manure for your wheat?—The marshes do not want lime; there is lime in the river from washing the chalk cliffs about Gravesend, which is carried up by the tide and mixed with the London manure that comes down, and is deposited upon the mud, from whence it finds its way to the marshes.

229. That is a deposit of chalk and not lime?—It is carbonate of lime, which is next to lime.

230. Mr. *Wilkinson.*] Have you any doubt in your mind, speaking as a practical agriculturist, that your marsh land would pay for draining?—No.

231. What are the obstacles to its being drained?—A great many persons occupying marsh land are graziers, and they like to see plenty of water, because the cowkeepers say the cows will not give milk without they have plenty of water to drink, therefore they pen it to make a head.

232. So far as they are concerned, their land would not be the better for drainage?—I think it would be better for drainage, but they are prejudiced.

233. The obstacles, in point of fact, to the drainage of this land, which would be a benefit, not only in an agricultural point of view, but as regards health, are the prejudices of a number of people, who take a mistaken view, according to your notion, of the results of draining?—I am satisfied that drainage would do good equally to the meadows as to the arable land.

234. If those prejudices were removed, would there be any difficulty in draining these marshes?—There is only one difficulty, with regard to the level.

235. I gather, from what you say, that there is no difficulty about the draining of this land but that which arises from a mistaken view of the subject?—From the opposition of prejudiced individuals.

236. Nothing requires to be done as regards the Commissioners, or anything of that sort?—I think not.

237. Sir *J. Shelley.*] With reference to the application of lime, is it not well known that it is of no use to apply lime to wet land; but supposing the land were well drained, the farmers would apply lime to it, and therefore very much increase the value of the land for growing purposes?—It would possibly improve by practice. I have no doubt it would be so.

238. Are you aware that lime is of no use on wet land?—It is of no use.

239. Mr. *Vansittart.*] Have you ever suffered at all, in making hay, from the water coming back upon the meadow land?—I did last year; the water came back among my cocks.

240. Have you any labourers dwelling in the marshes?—My workmen live in the uplands.

241. Do they ever stay down all night in the marshes?—No; they will not stop there.

242. Do you find any cases of illness among your men from working in the marshes?—Repeatedly. I have seen the men afflicted from going down there.

243. Do the men whom you employ in the uplands, and who are sent down to work below, suffer from the marshes?—They are apt to be affected; people that come from the uplands to the marshes are generally affected by them, especially if they drink the water.

244. You have spoken about another marsh which has been drained; do you know whether the people labouring upon that marsh suffer in the same way?—I think they would, because it goes all over the marshes.

245. Sir *J. Shelley.*] With regard to the live stock upon these marshes, has there been much disease amongst the sheep there lately?—We do not send the sheep down there; we are afraid of the rot.

246. Are they not sent there during any part of the season?—In the spring and summer, and the latter end of the year; they feed them as long as the ground is dry, and when the wet comes they are removed.

247. Has there been much increase of disease amongst the animals on the marshes in the summer time of late years?—I do not think so.

248. Mr. *Vansittart.*] Would it be possible to provide a supply of fresh water for the stock and cattle in the marshes if they were properly drained?—Yes; the fact is, before the South Eastern Railway carried their conduits under the railway, the managing man of the Commissioners did not look sufficiently to one of the conduits under the railway, where the main sewer is, and the banks of that sewer have been made for several years, by the accumulation of the drift from the uplands caused by the fresh water coming in; they have allowed that increase to sink down into solid ground, and now the water rides level with the top of my ground, and the banks being of a sandy and porous nature the water gets into my fields.

249. Would it be possible if the marshes were thoroughly dry to supply fresh water for the cattle to drink?—They can get plenty of fresh water, because they have only to enlarge the conduits to the river, and deepen the mains, to fill the ditches with water, and then deepen the approaches to the drinking places.

250. It is only required to deepen the ponds, and you could have a supply of fresh water?—To be sure; let the water be lowered down so that you can make a drain 3½ feet deep.

251. You do not conceive that there is any force in the objection which is made by the owners of the milch cows, that they will not get plenty of water?—They will get plenty of water, only they want it dammed up to the top that it may make a fence.

252. *Chairman.*] Are there any fences except those ditches?—Yes; the water wants lowering in the marshes, and you could have a drain of 3½ feet. That would increase the temperature of the ground, and you would get better crops and always have water by having deeper ditches, or larger approaches to that water.

253. Sir *J. Shelley.*] What is the subsoil of the marsh land?—On my land there is six feet of what is called marsh deposits from the river upon a bed of peat.

254. What is below the peat?—I think it is chalk; I dare say you will have to go down a considerable way for the chalk; it crops out on the uplands.

255. Mr. *Vansittart.*] Is not peat water very injurious?—I do not think it is so good as fresh water, though you may say that the water going through peat charcoal it takes all the colour out of it.

256. If these ditches were deepened, would they be sufficient?—Yes; the mud covers the peat; the water does not get to the peat; it forms a nasty drain over it, which is very prejudicial in the spring and autumn.

257. Mr. *J. MacGregor.*] You have heard some evidence given with regard to the state of the health of the population in the neighbourhood; does your own experience enable you to confirm that?—I have seen a great number of people afflicted with ague. A friend of ours lived opposite in a cottage belonging to us, and he was obliged to leave it entirely on account of his lady being afflicted with neuralgia and pains in the head, from the easterly winds from the marshes.

258. Lord *D. Stuart.*] Did that lady recover when she was removed?—Yes.

259. *Chairman.*] Have you any persons in your employment residing on the marshes?—No; they do not live near the marshes.

260. Sir *J. Shelley.*] What is the average rent of the land that is given in these marshes?—From 30 *s.* to 40 *s.*, and 50 *s.* an acre.

261. Is there more given for grass land than for arable land?—Yes, generally so.

262. I suppose cultivated land would be about 25 *s.* to 30 *s.*?—It does not go so low down as 25 *s.* I think the lowest is about 30 *s.*, and the highest about 50 *s.*, except in some places where it is accommodation land, and then 60 *s.* has been given by butchers.

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263. What do you suppose would be the increased value of the land to the agriculturist, provided by any means the land could be thoroughly drained. You have stated what difference there would be in the quantity and quality of your crops; what do you believe would be the average improvement per acre?—If you lay out from 6 *l.* to 8 *l.* upon the land per acre, the interest of that is generally about 5 *l.* per cent., that is, for the rental.

264. Would that increase the value of the land, at any rate, 1 *l.* an acre?—In some places it is quite enough as it is.

265. *Chairman.*] Supposing you pay 30*s.* an acre for cultivated land now, what increased rent do you consider that land would be worth if it were laid thoroughly dry?—I should say it would increase it from 5 *s.* to 10 *s.* an acre.

266. The Committee have heard from the last witness that it is supposed that if three-fourths of the occupiers of these marshes agreed to this improvement, the improvement would go on; do not you consider, for an increase of 10*s.* an acre in the value of that land, there ought to be no hesitation on the part of the occupiers?—I for one should not object to it; I would not give any more; my land rents now at 50 *s.*

267. Have you heard amongst the occupiers of the marshes generally a disinclination to be rated for this purpose?—I think the bulk of them are satisfied to leave anything like well alone; they are so prejudiced; there are very few of them that have been accustomed to drainage; it is portioned out in small allotments of 80 or 100 acres amongst different people; very few have been in the practice of draining, and they do not know the value of it.

268. They are satisfied with making a profit out of the land in its undrained state?—Yes.

269. Mr. *Wilkinson.*] In your opinion there is no want of outfall, and no physical difficulty in the way of draining these marshes thoroughly?—No; they can get plenty of outfall if they would increase the size of the sluices, and make the mains deeper; that is all that is wanted. If you make the ditches deeper you could have a deeper drain; but unless you do that you will never do any good at all.

270. It does not require any large engineering work?—No, not even a steam engine. I was down at Erith, looking over some land which was to sell, and I saw that some of the parties had penned the ditches up, to keep the water in the ditches to make a fence.

271. *Chairman.*] Do you act as a land agent at all?—Yes.

272. In valuing undrained land, the same as that which you now hold yourself, and land drained in the best way that it could possibly be, what would be the difference between an acre of the improved land in comparison with that which you hold now which is not drained?—Nearly half. I would sooner give 50*s.* for an acre well drained than I would give 2 *l.* for the other.

273. Mr. *Vansittart.* You are acquainted with the management of these marshes; do you conceive that it would be possible, under present arrangements, to obtain the consent of the necessary number to drain those marshes?—No, you must have an Act of Parliament.

274. You could not do it under the present condition of things?—No.

275. Sir *J. Shelley.*] Of course, if you are sent to value a farm for a landowner or for a tenant, to see what rent should be put upon it, you take into calculation first of all what the land will produce by fair farming, and the expenses of cultivation, and deduct the one from the other; if land drained will produce a quarter an acre more than land undrained, it necessarily follows that it is worth more rent?—Of course it is.

276. In addition to which, the cost of cultivation would be less on the drained than it would be on the undrained land?—The expense of cultivation is much the same, except that you pay a little more and have a better crop.

277. Lord *D. Stuart.*] I understand you to say that the great object of the persons who hold this land in not wishing to have it drained, was to have the ditches as a fence?—Yes.

278. If those ditches were made deep, in the way you propose, would not they serve as fences just as they do now?—Equally the same; it wants the water to be lower in the ditches, and then you can deepen the drains.

279 Mr. *Wilkinson.*] You think the ditches would be just as effectual for fences after they were drained as before?—Yes, and the ponds and approaches must be made deeper where the cattle drink.

280. I understood

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280. I understood you to say that the parties kept the water penned up for fences?—Yes; another object which some of them have in view is this; the water is penned up to lay the fresh water round the lower part of the marsh, where the water is a little brackish, so as to make a head, because Mr. Russell and myself command the springs; they make a head against us for the purpose of serving those who have grazing farms.

Mr. *William Stockley*, called in; and examined.

Mr. *W. Stockley.*

281. *Chairman.*] ARE you Senior Veterinary Surgeon of the Ordnance?—Yes.

282. How many years have you been the Senior Veterinary Surgeon of the Ordnance?—I have been 60 years in the service within a few months, but I have not been all the time at Woolwich; I have been generally abroad.

283. How long have you been at Woolwich?—Not more than five years.

284. You have been there, I apprehend, a sufficient time to judge particularly of the state of the horses which have been under your charge?—Yes.

285. Will you explain to the Committee what the effect of the marshes is upon young horses?—These facts have arisen under my observation: when young horses particularly are exposed to marshy wet situations, there is a peculiar disease generated, which arises from the damp and from the impurity of the low marsh lands, which is a disease of the chest, and produces water.

286. Sir *J. Shelley.*] Is it not like consumption?—No, it is a disease of the pleura; instead of its going on to inflammation it goes on to produce water in the chest. We remove them generally in time, but we never return those who are affected by the marshes. They recover upon the high ground where the infirmary is situated, and become strong again if they are detected in time. There is precisely the same effect produced in all situations of that kind. I served a long time in Ireland, and whenever horses were turned out in marsh-land situations they were affected. No doubt the malaria is debilitating to their constitution; it runs on from inflammation, which is produced by damp, to debility and water; there is nothing peculiar in these marshes to any others which I have seen.

287. *Chairman.*] Have you found it worse at Woolwich than at the other places where you have been employed?—I have never been so circumstanced with regard to public horses; but in Ireland, where I served for a number of years, I saw a great deal of the country, and it was always the case there; but I am quite satisfied that the marshes at Woolwich are unhealthy to horses in the spring of the year.

288. Sir *J. Shelley.*] Do you find that the summer is unhealthy?—When the land becomes dry and the air is light there is no disease amongst them; we keep them in sheds in the winter, and when they are turned out the weather has become warm.

289. Taking this season, how soon do the marshes become healthy for horses?—I think it has been healthy certainly these two months. I do not think I have had a case in the infirmary these two months, and we have a large number of horses.

290. Mr. *Vansittart.*] Has not this been an unusually dry season?—Exactly so.

291. Do you find that there is less disease amongst the horses in dry seasons than wet seasons?—Yes, decidedly, in warmer seasons there is less; the first heat rather increases the disease.

292. Mr. *Wilkinson.*] Have you lived any length of time at Plumstead?—I have resided only at the Royal Infirmary on the Common, near the Dover Road.

Veneris, 7° die Julii, 1854.

MEMBERS PRESENT.

Sir Edmund Filmer.	Lord Dudley Stuart.
Sir John Shelley.	Mr. Alderman Cubitt.
Mr. James MacGregor.	Mr. Wilkinson.
Mr. Masters Smith.	Mr. Vansittart.
Colonel Dunne.	

SIR EDMUND FILMER, BART., IN THE CHAIR.

John Flint South, Esq., called in; and Examined.

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293. *Chairman.*] WHERE do you reside?—At Blackheath Park.

294. You are Surgeon at St. Thomas's Hospital, I believe?—Yes.

295. Has your attention been at all called to the nature of the marshes in the neighbourhood of Blackheath?—Yes; particularly to the Charlton Marshes.

296. Will you be kind enough to give the Committee the result of your knowledge of these marshes?—My knowledge of the marshes originated in having been appointed last year a member of the sanitary committee of Charlton, and the Walscot district of that parish having been assigned to me, with some others, to overlook. I then made a report to the Sanitary Board, of which this is a copy, which, with the permission of the Committee, I will hand in. [*The same was delivered in.*]

Vide Appendix.

297. Will you, as shortly as possible, state the substance of that report for the information of the Committee?—The Charlton Marshes are very much lower than the river, from which they are protected by an artificial bank about 10 or 12 feet high. One or two large spring ditches run through them, carrying off the spring water, and also the drainage, from the private ditches; but for the most part the private ditches are very imperfectly looked after. In the river bank are one or two sluices in connexion with the spring ditches, which are opened at very irregular times, as may suit the occupiers of the land in their immediate neighbourhood; and consequently, during the greater part of the year, the ditches are in a very filthy, nasty state, very offensive, and full of decayed vegetable matter and mud. The drainage generally is extremely imperfect. Between a private road which separates Charlton parish from Greenwich parish, one part, the eastward side being in Charlton, in the occupation of Mr. Roberts, and the westward side being Mr. Angerstein's property—between that road and Woolwich parish, which is separated from Charlton by a road, called the Manor-way, almost the whole of the land is swampy. Even at a very short distance from the surface, if a trench only a foot or 18 inches is dug, it soon fills, and the drainage does not run away. A vast number of houses have been built, and are still building, particularly towards the east end of the marsh, which is in a very swampy, unhealthy condition; many of the tenants state that they cannot keep their ground floors dry, and not even the hearth-stones, in some instances. The only drainage from those houses, at the time when I visited them last autumn with the other members of the sanitary committee, were some small drains about 18 inches wide, and about as many deep, into which the drainage from the cesspools and from the houses ran; part got away as it could, by soaking into the ground and by evaporation. Where it could not get away quite so quickly, it spread over a large space, and formed very stinking, standing pools of water. Running into these a great number of six-inch drain pipes are also laid. I went over the district this morning on purpose to see if any alteration had been made. Under the direction, as I am informed, of the surveyor of Roupell's estate, to which the greater part of this property belongs, large 12-inch pipes are now being put down, and run into the spring ditches belonging to the Commissioners, although I apprehend without the right to do so, in place of the narrow gutters, which I mentioned as being so offensive last October; and communicating with them are small pipe-drains for the house sewage, and each two houses having one small pipe-drain.

298. How

298. How will that affect the marsh?—It will make the ditches sewers; I believe they have no right to pass any sewerage into those ditches.

299. You mean to say, that from the houses there are actually sewers into these open ditches?—Yes; and more are being run into them from the Roupell property.

300. Your opinion is, that it will be injurious to the general health of the district?—Yes.

301. Mr. *M. Smith.*] The common drainage of all this filth into the marshes, and the opening of the sluices, depends upon the caprice of each individual owner of land who may think that he has too much or too little water?—I think that is the case.

302. In fact, there is no regulation of the Commissioners of the Level, with respect to the opening of the sluices being under their own superintendence?—I think the sluice by Charlton Pier is regularly opened; but with reference to the sluice which is by Mr. Angerstein's property, which is just to the westward of Charlton parish, it was stated, when we made our visit last October, that the farmers occupying the land raised the sluice, or put it down, just as it might suit their purpose.

303. According to your observation, the only sluice which is under the direct control of the Commissioners is the sluice to which you allude?—The Charlton sluice is opened regularly; I believe it is opened every day. I have the report of the cases of ague which have come into St. Thomas's Hospital for the last three years amongst out-patients, not those which have come in-doors; but this is a very imperfect return. There have been doubtless a great many more cases than are stated here; but these ague cases are principally derived from the marshes on our side of the water; the Charlton, Woolwich, and Plumstead Marshes. And moreover, I may state, that one of the medical men who lives in the neighbourhood of the railroad, Mr. Gateshead, told me that a number of persons were continually afflicted with ague.

304. Have you attended any of those patients yourself?—No.

305. Mr. *Vansittart.*] Do you know, from your own knowledge, that ague is very prevalent in that district?—Yes, I do, certainly.

306. *Chairman.*] You say that you have not attended any of these ague cases yourself?—I do not go down in that neighbourhod; but, frequently, people come over to me from that neighbourhood having ague, and I give them quinine.

307. Have you patients from that locality whom you attend?—Yes, occasionally.

308. From your knowledge of them, and where they live, do you think the marshes are the predisposing causes of the ague?—No doubt about it.

309. Are those frequent cases?—Yes; not at all infrequent.

310. Mr. *Vansittart.*] Does the present state of the marshes, as to drainage, affect the drainage of the houses in the district around them?—There had been no attempt at draining the houses at all till the Sanitary Board took the matter up last autumn.

311. You have stated that they drain into the marsh ditches?—Yes, two or three parties did formerly; but, as I have just stated, many large pipe-drains are now being run into them.

312. The water in those marsh ditches, when it is high, affects injuriously the drainage of those houses, I suppose?—Yes; if it were high, it would, when the drainage now making is finished.

313. In its present state?—Not for the most part; because the surface of the ditch is, I should think, about 18 inches below the surface of the land; but if the weather were very wet, more water would come down, and, of course, the ditches becoming fuller, the water would flow back into the houses.

314. You do not think that in its present state the drainage of those houses of which you have spoken is affected injuriously by the marsh ditches?—Not by the marsh ditches; for however little water they may carry off, the swampy soil on which the houses are built must be improved, as at a depth of 12 or 18 inches beneath the boarding of the ground floor, more or less standing water or filthy mud is always found; so that the drainage hitherto has been only about 18 inches below the surface of the land.

315. Then it would be impossible to drain them properly without lowering

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those ditches into which they drain?—Yes, I think so; the lowering of the spring ditches might be done without any great difficulty, because, if my memory be correct, at Charlton sluice there is still a fall of some 12 feet depth below the level of the ditches at low water.

316. Do you consider the present state of the marshes to be so bad as to affect injuriously the health of the people living near them?—No doubt.

317. You consider that will be aggravated by the amount of filth and drainage which is gradually coming out of those marshes?—Yes, and which increases daily, because more and more houses are being built.

318. You consider the improved drainage of these marshes of the greatest possible importance?—Yes.

319. If it is not improved it is likely to have a serious effect upon the adjoining district?—No doubt; because we continually, in the winter, in damp weather, get fogs from the Charlton Marshes coming over Blackheath.

320. You say that you examined those marshes last year; can you say, from from what you saw, that it would be possible to drain these marshes more effectually?—There is no doubt about it. I should say it might be done very easily, so far as a common observer could give an opinion.

321. You are satisfied of that?—Yes.

322. Mr. *J. MacGregor.*] Whatever may be the rule of the Commissioners with regard to the opening of the sluices, still the fact is, that the drainage from above remains in the ditches and aggravates the nuisance?—No doubt about it.

Sir *Culling Eardley*, Baronet, called in; and Examined.

Sir *C. Eardley*, Bart.

323. *Chairman.*] I BELIEVE you reside at Belvedere, in the parish of Erith?—Yes.

324. Close to these marshes?—Yes.

325. Can you speak of your own knowledge to the state of those marshes with regard to public health?—I can speak to some of the results which have been produced in the neighbourhood from the condition of the marshes; the neighbourhood is in one continual state of ague. My own house is protected from the height of its position, and a gentleman's house is less liable to the influence of malaria than the houses of the lower classes. But even in my house we are liable to ague; and to show the extraordinary manner in which the ague operates, in the basement story of my house, where my men servants live and sleep, we have more than once had bad ague. In the attics of my house, where my maid servants sleep, we have never had it. The higher you ascend a hill, the less liable you are to ague. I can mention instances of persons of usefulness in my neighbourhood who have been either prostrated by disease or who have been compelled to leave the neighbourhood.

326. Can you state their names?—I cannot speak to any great number of cases, but I can mention three rather important cases: one, a Scripture reader, employed by myself; another, a schoolmaster; and a third, a schoolmaster. I had a Scripture reader who resided on Lesness Heath, of the name of Mr. Holloway; he and his family were liable to ague; they struggled against it for two or three years, but were obliged to leave the neighbourhood last year; one of his children died after he left me. The constitution of the whole family was reduced by ague; he was a man with a large family, all of whom suffered more or less from ague. I had a valuable schoolmaster, named Mr. Hagger, in Erith, which is at the bottom of the hill, Lesness Heath being at the top of the hill. After being again and again ill, last autumn he was obliged to leave the parish, and has gone to live elsewhere. I also had a schoolmaster, named Mr. Jones, in my school at Lesness Heath, which is at the top of the hill, who has left within the last four or five weeks. He suffered dreadfully from ague himself before he left me; and one of his children, an infant, went away under ague, which the infant had had for several months.

327. Have you any knowledge of their health since they left the neighbourhood?—The person I last mentioned has left so recently that I cannot speak to his health; but in the other two cases, I can speak to the health of both parties having materially improved since they left; I can also speak to this fact, that persons are deterred from settling in the neighbourhood by the aguish character of the country. Many persons, attracted by the beauty of the locality,

locality, wish to come down and settle; but when they find it liable to ague, they have been compelled to give up that intention. I may mention that the village of Erith itself bears marks of the influence of malaria; it is more like one of the desolate towns in Italy, Ferrara for instance, than a healthy happy English village. I do not know whether it is known to the Committee that Erith is the village described in Dickens's "Household Words" as "Dumbledowndeary," and that is a most graphic and correct description of the state of the place, attributable to the unhealthy character of the locality.

328. Has there been any attempt made to obtain an improved state of drainage?—On the 1st of November last year a meeting of several gentlemen was held in my house; Lord Shaftesbury and Mr. Chadwick came down from London, on account of the interest felt by the Board of Health in the subject. A good many gentlemen of the neighbourhood were assembled, and a committee was formed, which committee has ever since been engaged in collecting information, and stirring up public opinion; and I have now the pleasure of putting in two documents, if the Committee will allow me to do so. One is a report of the sub-committee of that committee, embodying a large amount of evidence which has been collected by us, not merely about the Erith Marshes, but about the districts from London down below Gravesend, in Kent, and from London down to Rochford Hundred in Essex.

329. Mr. *Vansittart.*] You have been asked whether any attempt has been made to improve the drainage of the locality. Has the effort which has been made been to show the extent of the evil, with a view to exciting the people to amend it; or has any effort been made to improve the state of the marshes, by the Commissioners of that district or those who are able to do so, or by the inhabitants?—The Commissioners of that district feel that they are unable to execute any works adequate to meeting the evil, and they are by Act of Parliament precluded from doing any new works unless three-fourths of the proprietors and occupiers of land consent; and that is equivalent to a prohibition of any new works.

330. It is impossible to obtain the consent of three-fourths of the owners and occupiers?—It is felt that it would be impossible to obtain it; there is not, on the part of a large number of persons, a sense of the necessity of a change.

331. *Chairman.*] Have you found it impracticable to obtain such proportion?—I believe the Commissioners have done so; I have only resided in the neighbourhood a comparatively short time; I know that the conclusion to which the Commissioners have arrived is, that they do not believe it to be feasible to effect any change in that way.

332. Mr. *Vansittart.*] They feel as a corporation that it would be impossible, and they do not think it worth while to make the attempt?—Yes; I believe that is the feeling of the whole of the Commissioners. I believe it is their feeling that the parties would not consent to any change.

333. Mr. *M. Smith.*] The result of your evidence, I collect, so far as you have gone, is that the ague of which you have stated instances has been occasioned by miasma arising from the marshes, and that is occasioned by inefficient drainage?—Yes.

334. *Chairman.*] Have you had any experience of drainage in any other levels?—I have been for a good many years a Commissioner of the North Level of the Bedford Level, and there is a very striking contrast between the thorough drainage of that district, a long way from the metropolis, and the very defective drainage of our district, which is close upon the metropolis. I do not know whether the Committee are aware of the proportion which our undrained district bears to the metropolis. It has been stated that London stands upon about 20,000 acres of land. Upon the north-east there abuts the Thames Marsh district of 32,000 acres of undrained land. This is equivalent to a person living in a house of 20 feet frontage, with a marsh of 32 feet abutting upon it. In the North Level the drainage has been thoroughly effected, by means of applications which might be very easily adopted in this district.

335. *Chairman.*] In this level, of which you are speaking, there is no great difficulty in draining?—No.

336. Is there anything, with regard to what you state, about three-fourths of

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the occupiers being obliged to assent?—That system is entirely superseded in the Bedford Level.

337. You apprehend that there could be no difficulty in draining the other level upon the same principle as that upon which the Bedford Level has been drained?—None whatever, if the same means were employed.

338. Mr. *M. Smith.*] Are those means by steam, or by natural outfall?—By natural outfall. But the great means which has rendered that district well drained is, that a certain number of persons were chosen by the proprietors who possess their confidence; they have no difficulty in taxing the country; they have very large powers of taxation.

339. Is there an outlay in the purchase of steam apparatus, or is the draining effected by a natural outfall and ditches, which run all the water off?—Both steam and windmills are entirely superseded. The river Nene has been deepened down to the sea, and by that means a completely natural system of drainage has been obtained.

340. In that district, you have a great advantage in the possession of a natural outfall, by which the water from the uplands flows through the marshes, and is conducted off?—We believe that we have the same in the case of the Thames marshes; we believe there is a natural system of drainage perfectly feasible, and a perfectly natural supply of good fresh water which might be brought for the cattle.

341. Mr. Alderman *Cubitt.*] The difference in the two cases is just this: the river Nene takes the water from the land at high water as well as at low water, whereas the Thames only takes the water from the lands at low water?—In the Nene the waters flow off only at low water; there are sluices which open at high water and shut at low water; but engineers report that the Thames marshes might be drained in the same manner.

342. *Chairman.*] Has there been any communication with the Government upon this subject?—Yes; the Government have expressed great sympathy with this subject, and rendered us considerable aid in prosecuting it.

343. Mr. *Vansittart.*] You spoke about some heath where two of these cases of ague have occurred; that is not in the marsh, I believe?—Lessness Heath is not in the marshes.

344. It is upon the higher land?—Yes.

345. Those instances prove that the ague is not confined to the marsh itself?—Exactly; which is notoriously the case round our neighbourhood.

346. Mr. *M. Smith.*] Is it not the fact sometimes that the uplands are more liable to disease, if anything, than the immediate vicinity of the river?—I dare not say more, but I believe equally so.

Mr. *Charles John Pinching*, called in; and Examined.

Mr. *C. J. Pinching.*

347. *Chairman.*] DO you reside at Gravesend?—Yes.

348. What length of time have you resided there?—I have known Gravesend for nearly 20 years, and resided in and practised there as a surgeon nearly 14 years.

349. Has your attention been particularly called to cases of ague and remittent fever from malaria?—It has.

350. Will you state to the Committee your experience with regard to cases of that description, and the cause of the malaria?—I have had many instances of fever of a severe type occurring about the marsh land in and round Gravesend, and ague to a very great extent also.

351. Do you know the state of the marsh lands from visiting the people there?—Yes, I do, east and west of Gravesend; as far as Greenhithe west, and as far as Shorne Battery and Higham and Cliffe east; Swanscombe, and all the neighbourhood south of the town.

352. Is there much ague and fever in the marshes about there?—There is a great deal.

353. Do you frequently go to Greenhithe?—I do not go frequently to Greenhithe. I have attended patients at Greenhithe, but very seldom.

354. On the other side of Gravesend have you attended many cases of ague?—Very frequently, as far down as Shorne Battery. I speak to my own experience as far as Shorne Battery and Higham. Higham is lower down; but when Shorne Battery was being erected, I know that many of the workmen who were

were employed in the excavations were labouring under severe marsh fevers of a very bad type.

355. Do you go as far as East Chalk?—Yes.

356. Have you known cases of ague at East Chalk?—East Chalk is proverbially aguish.

357. Have you known cases of ague at Lower Shorne?—Yes. Upper Shorne is on very high ground, and it also suffers from malaria.

358. Is Shorne Battery close by the river?—Yes. I never saw fever of a worse type than I witnessed amongst the workmen there, combining the intermittent and remittent type.

359. Mr. *Vansittart.*] Were they always employed in excavating?—Yes; for the foundations of Shorne Battery, and the works connected therewith.

360. You refer to the time when Shorne Battery was first made, and not of cases at the present time?—I do not refer to the present time; it is about five or six years ago, when they were excavating for laying the foundations of Shorne Battery, that I am speaking.

361. At present, as regards the other places which you have mentioned, cases of ague and fever are still very prevalent?—Yes, very prevalent; I think I have used more quinine (which is the only sure remedy for ague) in my practice for the last six years, than I ever did before.

362. Are the cases of ague and fever which are now prevalent in those marshes of a very bad description?—No, I think not; they are very prevalent, and other diseases take on an intermittent character.

363. Do you attribute that to the state of the drainage of the marshes?—I always did so, and to the marsh land all round; I attribute it to the neighbourhood of extensive marshes both on the Essex and Kent shores.

364. *Chairman.*] Have you known any parts in the neighbourhood of which you are speaking which have been drained since you have been there?—Not newly drained; I think not, to the best of my belief.

365. Do you practise on the other side of the water, opposite to Gravesend?—Very seldom. I have patients who come from the other side of the water to my house.

366. Mr. *Vansittart.*] Have you any ague and fever patients come to you from the other side of the water?—Ague and chiefly diseases of an aguish character; enlarged spleen, called the ague cake, and diseases of that kind produced by malaria.

367. Mr. *J. MacGregor.*] Are the ditches in the marshes in a foul state?—I should say they were, generally speaking.

368. Have you been sufficiently upon the marshes to observe the state of the ditches?—I think the ditches are in a foul state; I think there has been more ague since the canal has been closed under the tunnel than there was before.

369. *Chairman.*] Do you mean the Thames and Medway Canal?—Yes; in consequence of the want of the tidal stream from the Medway to the Thames, replenishing and refreshing the water of the canal; that is a remark of my own; I do not know whether I am right; I think there has been more ague about Gravesend since that tunnel has been closed than there was before.

370. Mr. *Vansittart.*] Has there been any improvement in the state of the marshes of late years; have they been better drained?—I do not think they are so much under water as they used to be.

371. *Chairman.*] Do you think the class of diseases which you have mentioned have decreased instead of increased?—Increased.

372. Mr. *M. Smith.*] With respect to Shorne Battery, you are aware that there were two periods of making Shorne Battery: one many years ago, and the other the re-creation of it. Do you refer to its re-creation within the last five or six years?—Yes.

373. You have stated, I think, that you had never known worse cases of fever than occurred there during the period it was building?—Yes.

374. To what do you attribute that?—To the fact that the men who worked in the marshes, perhaps, came from a distance and from a non-aguish district. We know that when people who have been accustomed to a healthy neighbourhood come to an unhealthy neighbourhood, they are always more likely to take the prevailing diseases of the district than those who have been brought up in the district.

375. You attribute the disease amongst those men, not to the state of the

Mr. *C. J. Pinching.*

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marshes, but to periods when the work was going on, and to the nature of the work in which the men were engaged?—I attribute it to the nature of the work, and to their residence in the marshes.

376. And to their susceptibility to disease?—To their residing in the marshes; temporary sheds were erected, and they were almost lying upon the surface, with merely a layer of brick upon the earth.

377. You attribute their disease, as I understand you, to the nature of the works there going on, rather than to the existing state of the drainage of the marshes?—I would say both together; I think it is very likely that the disturbance of the alluvial deposit underneath may have increased the malarial exhalation.

378. You have spoken of two districts of drainage, one the canal, and the other Shorne Battery, for example, being a district separate from the canal; is the water salt or fresh which is in the canal?—Brackish, I should think.

379. Does it flow in from the Thames?—Yes, partly.

380. Then with respect to the ditches which go through the marshes all round Shorne Battery, is the water fresh or salt in them?—I am not quite sure of that; I never tasted it. But there is a great deal of deposit of filth and vegetable matter putrefying in those ditches; it always struck me that they were not deep enough.

381. Are you aware that the canal is under a separate management?—I am aware of it; I am aware that the canal is now under the South-Eastern Railway Company. I am not quite sure in whose hands the other drainage is; I have heard of the Rochester Commissioners of Sewers. I do not know how far towards Gravesend the Commissioners of Sewers have power. I only speak of the general state of the marshes. I think there is a deficiency of drainage, generally.

382. Mr. *J. MacGregor.*] Do you consider that the health of Gravesend itself is much affected by its proximity to these marshes in their present state?—Yes.

383. Is it your opinion that the better drainage of the marshes would improve the health of the town and neighbourhood?—Yes, on both sides of the river in Essex and Kent; we are affected by the marshes on both sides of the river.

384. Mr. *Vansittart.*] Have you cases of ague and of an ague-like character in Gravesend?—Not so much ague as other diseases, putting on an ague-like character.

385. *Chairman.*] Have you cases of remittent fever?—Yes, and fever taking on an intermittent type as well.

Mr. *James Russell,* called in; and Examined.

Mr. *J. Russell.*

386. *Chairman.*] I BELIEVE you farm very largely in the neighbourhood of some of these marshes?—I do.

387. Will you state whereabouts your principal lands lie?—I live at Horton Kirby; I have had a farm, which I have given up to my son very lately, in the parish of Plumstead, for the last 17 years, of nearly 400 acres.

388. Mr. *Vansittart.*] Is that marsh land?—Some of it; lately I have used some of it as market garden; it is chiefly arable land which I held in the marsh.

389. *Chairman.*] Do you consider that these lands in Plumstead Marsh are sufficiently drained for the purpose of agriculture?—I do not.

390. Will you state the result of your experience upon that subject?—Having, at my own expense, under-drained about 200 acres, I have found a considerable benefit by it; I think all the land in the parish requires under-draining in those marshes. I find that my crops have very much improved since I have under-drained those lands; and I have no doubt that all the lands in the marshes are quite equal to mine, and that they would benefit equally to mine if they were under-drained.

391. What is the outfall?—The outfall is into some ditches, which ultimately lead to a sluice or sluices, which I regret to say are not sufficiently large to receive the water at all times.

392. Sir *J. Shelley.*] Who has the control of those sluices?—The gentlemen who are the Commissioners of Sewers.

393. Do you know how they are appointed?—I believe they are self-elected.

394. Mr. *Vansittart.*] You say you have drained your land; does the water ever come back and fill up your drains?—Only in flood-time; I have succeeded in under-draining my lands; I have kept them perfectly dry; but in the winter, in what we term flood-time after heavy rains, the waters from the hills accumulate to such an amount, that before the sluices can discharge them our lands are, many of them, overflowed for acres in places where I have under-drained them.

395. Do they remain long in this flooded state?—Perhaps three or four days.

396. How long is it before the water sinks sufficiently for the drains to act thoroughly?—It would take perhaps some weeks before the drains were sufficiently cleared out to admit the water from the drains which we have made to discharge the land waters.

397. Sir *J. Shelley.*] Have you held land for some time in that part of the marshes?—Seventeen years.

398. During that time are you aware whether any general system has been pursued by the Commissioners to keep the sluices properly cleaned out and cleared; is there any period of the year when that is done under one general system?—I do not know that.

399. Is it the fact, that it is left to individuals, so that sometimes one person cleans a sluice, and another tenant clears his out for a year or two; is there any system of general clearance of the outfalls by the Commissioners?—I believe all those sluices are under the control of the Commissioners and their servants; they are not left to any private individuals to do anything with them.

400. Do the Commissioners periodically, under a general system, clean out the outfalls and sluices?—I do not know that they do; the Commissioners frequently walk round the walls and examine the defects, if there are any, and give instructions to their servants to do what they have the power to do.

401. Does not drainage depend upon the outfall being properly made?—Yes.

402. Having occupied marsh land for 17 years, do you know whether there is any period of the year at which a general system of scouring out these outfalls takes place by the Commissioners?—I do not know that there is any particular period.

403. Nor that it is done at one and the same time on a large scale?—No, I do not know that it is. My complaint has been made frequently to the Commissioners, that my lands have been flooded in consequence of the sluices not being either large enough or low enough, I am not engineer enough to know which; but I know, if I had power to make a sluice myself through the banks, I could relieve myself. I have applied to these gentlemen, and they have told me that they were willing to do everything I required; they admitted it was necessary, but they had no power to do so, in consequence of their being shackled by the Act of Parliament, unless three-fourths of the landowners and occupiers would petition them, as I may say, to do so. They have no power to relieve me.

404. You say you have drained about 200 acres; at what average expense per acre has that been done?—I think the average expense was about 5 *l.* or 5 *l.* 10 *s.* an acre.

405. You find, although great benefit has arisen, yet that the system of drainage of your land cannot be perfect, in consequence of the deficiency of the outfall?—That is all; it would be perfect but for that.

406. Mr. *M. Smith.*] Do you suppose, from the answers which you had from the Commissioners, that they have no power to make the sluice larger than it is now, or to construct any new works, without the consent of three-fourths of the owners and occupiers?—That is the reply I have received from Mr. Charles Pratt, who is the chairman of the Commissioners, when an application has been made to him. If they could get the consent of three-fourths of the landowners and occupiers, I believe they could do it.

407. That applies, I suppose, to the provisions of the Sewers Act with respect to making any new works?—I do not understand the Act of Parliament at all; I am sure they have done everything they could do but that.

408. Sir *J. Shelley.*] As a large farmer, have you made any calculation as to the improvement per acre of arable land by thorough and complete drainage?—I have not made any calculation.

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409. Do you consider it would increase in the growth of a crop of wheat a quarter to the acre, the difference between thoroughly drained land and undrained land, upon the average of years?—I think you may take that as a moderate calculation.

410. Mr *J. MacGregor.*] Is it not the case that many holders of land in the marshes keep the water dammed up in their private ditches?—They do, and I complain of it daily.

411. No outlet takes place from those ditches into the main sewers of the Commissioners?—Not until they are tired of keeping the water up; they keep the water up week after week.

412. Sir *J. Shelley.*] Have the Commissioners no power over those ditches?—The Commissioners sanction it, and allow their men to make the dams, and pen it up against my lands. I went round this morning to look at them. I found in the dams adjoining my own land that they were penning the water up to the very surface of the grass; the land on my side is arable land, the other is grass land let to cowkeepers, who fancy that their cows will not produce milk without they can walk to the edge of the land, and put their noses into the water without walking to a drinking place. There are some who have made drinking places five or six feet down where the water is not penned up; there the land on either side is drying up. But the complaint we make, as arable-land farmers, is, having the water penned up against us for the purpose of merely watering the stock.

413. Have you made complaints to the Commissioners of the circumstance to which you have now alluded?—Over and over again.

414. Without those complaints having been attended to?—Yes.

415. You, as an arable farmer, object to the water being penned up; is it not equally important to the grass farmer that the grass land should be kept dry, as well as the arable land?—I have endeavoured to make that impression upon the grass farmers, but I never could get any of them to give me credit for it; they fancied I wanted to serve myself alone. I have stated to them what I have stated to the Committee; my experience leads me to believe that, if that water was taken from that land where I saw it penned up this morning, and kept 10 feet down below, the grass land would be worth as much again.

416. Mr. *Vansittart.*] I believe you have only land on Plumstead Marsh, and upon no other marsh?—I have not any land in Erith. I have other lands, but they are all dry lands.

417. Mr. *M. Smith.*] Are the marshes which are undrained situated as low as the lands which you have drained?—They are not low lands; they are, upon the average, level with the rest of the marshes.

418. Relatively, as regards the surrounding land, the uplands and the river, does it lie in a bed?—There are about 3,000 acres in the two parishes on as nearly a dead level as it is possible.

419. Is there a good outlet to the Thames?—Yes.

420. Is there a fall to the river?—Yes; the ditches should be deeper as they approach the banks of the Thames than they are at the upper part.

421. In fact, as I understand, there is not any attention paid to the outfall of the water towards the Thames, but the water is left to lie upon a dead level, instead of taking advantage of the fall towards the Thames?—The sluices are not half large enough; there must be a great quantity of water thrown back upon the land; but, independently of that, the lands now do not get the natural relief, because the water, as I have stated, is so penned up that the marsh land is completely saturated, because the water cannot get away.

422. Is this damming-up process done at the caprice of the landowners, requesting these wall-men to do it, or under the direction of an inspector who is the agent of the Commissioners of the Level?—This subject has been talked over by the landowners. The occupiers of the grazing land contend, and perhaps fairly contend, that their wants should be attended to as much as mine; the stock requires fresh water, and they cannot have what they call sufficient fresh water without penning it up in the way I have described. I contend that they have a remedy if they only make sufficient drinking places, and make them properly, so that the stock could walk into them. By a difference of three feet they would relieve my land, and all other land, without penning the water up in the way I describe, by letting the cattle walk to drink.

David Corbet, Esq., M.D., was called in; and Examined.

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423. *Chairman.*] WHERE do you reside?—At Orsett, in Essex.

424. Has your attention as a medical man, been called to ague and fever, and different diseases which arise from malaria in that district?—No doubt of it whatever.

425. How far does the district extend?—From Fobbing to Wennington and West Thurrock. I know it to Fobbing, and along the banks of the Thames.

426. Will you state your opinion as to the cause of the diseases which have been mentioned?—The whole type of disease which prevails in that district indicates a malarious and badly-drained country.

427. Do you know the nature of the country well?—I know it well; fever, ague, and dysentery prevail in that district. I have made an extract of the number of cases last half year which I was called upon as district surgeon to attend. There were 425 cases: of those there were 39 of dysentery; 47 of bilious fever; 36 of ague; and many other cases of chronic affections of the liver, bilious affections, and dropsies, originating no doubt in ague.

428. Were you present when Mr. South was examined?—Yes.

429. Do you agree generally with his views?—Yes.

430. Mr. *Vansittart.*] You have no doubt that the cause of those diseases is the state of the marshes in your neighbourhood?—No doubt whatever.

431. Mr. *J. MacGregor.*] Have you any doubt that a better system of drainage would remove a great portion of those diseases?—I have no doubt of it; the present system seems no system at all, and very expensive.

432. Mr. *Vansittart.*] Have those cases been upon the increase or decrease lately?—They have been exceedingly prevalent lately.

433. Mr. *Wilkinson.*] Has any alteration taken place in the state of the drainage?—There has been no great change for the last 20 years.

434. Sir *J. Shelley.*] Either for better or worse?—Either for better or worse. In some seasons those diseases prevail more than in others; this being a wet season they have prevailed more than usual.

435. Mr. *Wilkinson.*] Have you made any observations as to the extent of the influence of the malaria beyond the marsh in the immediate neighbourhood?—It extends a considerable distance; I have known it to extend as high as Laindon Hills, the name of a parish standing off the marshes, and very high.

436. Do you think it would extend as far as the metropolis?—I cannot give an opinion upon that, because there may be causes of ague nearer than the marshes; but that it extends at least half a dozen miles from these marshes I am quite sure.

437. Mr. *J. MacGregor.*] Do you know that from your own practice?—Yes.

Richard Heath, Esq., called in; and Examined.

R. Heath, Esq.

438. *Chairman.*] Where do you reside?—At Grays.

439. Have you an extensive practice as a surgeon in the neighbourhood of Grays?—For the last two years I have had.

440. Mr. *Vansittart.*] What district of the marshes do you speak of?—The marshes from Purfleet to West Tilbury, through East and West Thurrock.

441. Sir *J. Shelley.*] Is not that an agricultural district altogether?—Yes; principally marsh land.

442. Is it near any large town?—The largest town is Grays, and that is very small.

443. Mr. *Vansittart.*] Are fevers and ague prevalent in your district?—Yes, they are the prevailing diseases.

444. Do you attribute them to the existence of the marsh land?—There can be no question that they arise principally from the want of proper and thorough draining.

445. You attribute those diseases to the defective drainage of the marsh land?—Yes.

446. Mr. *Wilkinson.*] Have you any observation as to whether the influence of malaria extends beyond the immediate marsh?—I think it does; there is no question that currents of air carry the poison far beyond the centre of its production.

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447. Mr. *Vansittart.*] You state that from your own experience?—I do.

448. Mr. *Wilkinson.*] Can you say to what extent the malarious influence extends; do you think it extends for a mile or two?—I think there is hardly any limit to its poisonous influence.

449. *Chairman.*] Have you lived in other marsh districts?—Yes.

450. In what district?—In Sussex.

451. Where were those marshes?—Near Rye.

452. Sir *J. Shelley.*] Are not those marshes salt marshes?—Yes.

453. Did you find much ague there?—Plenty.

454. Mr. *M. Smith.*] Is it not the case that the law of ague and that sort of diseases is so capricious, that you can really give no decided opinion upon it?—We do not know the specific poison which produces it; we only know that ague, and all diseases of that type, originate from breathing a malarious atmosphere, which arises from decomposition of vegetable matter.

455. Sir *J. Shelley.*] Do you speak to the marshes upon the north side of the river?—Grays, opposite Northfleet.

456. Are the marshes there in the same condition as those in the neighbourhood of Rye?—They are undrained.

457. Are those marshes in the neighbourhood of Grays, and so on, close to the Thames, in the same condition as the Romney Marshes in the neighbourhood of Rye?—I cannot now give an opinion as to the condition of the Rye Marshes, because it is nearly 20 years since I resided in that neighbourhood.

458. Mr. *J. MacGregor.*] Have you known anything of a marsh district which has been improved by better drainage?—Yes.

459. Where?—In Lincolnshire.

460. Have you seen improved health arising from that?—Yes; in drained marshes you rarely get cases of ague.

461. Is it your opinion, with respect to the marshes on which you reside, that a better system of drainage would banish the ague?—I am satisfied that the health of the district would be benefited.

462. Can you offer any opinion as to the extent of the effect of malaria?—I am of opinion, as I said before, that there is hardly any limit to its baneful influence; I think certain winds may carry the poison to a very considerable distance.

463. Mr. *Vansittart.*] If there is no hill to intercept it?—Yes.

464. Mr. *Wilkinson.*] Do you think it would be carried up the Thames?—Yes; the easterly winds which prevail at certain seasons of the year would produce very strong influence upon the metropolis.

465. Sir *J. Shelley.*] Have not the fogs which hang upon the river in the autumn of the year a baleful influence upon the people in the river?—Yes; the persons who are most influenced by ague are those who are exposed to night air, and whose condition is more apt to receive the impression of disease from their not living so well as the better classes.

466. Are you acquainted with drainage at all?—I cannot say that I am.

467. Do you believe that any system of drainage would entirely remove the unhealthiness which attaches to marsh land?—I question whether you could remove the fogs, because you get fogs where there are really no marsh lands.

John Manley, Esq., M.D., called in; and Examined.

J. Manley, Esq., M.D.

468. *Chairman.*] DO you live at Barking?—I do; I have resided there for the last 28 years.

469. Where are the Barking Marshes situated?—The Barking Marshes are directly opposite the Plumstead Marshes, on the north side of the river.

470. Mr. *Vansittart.*] How far does your district extend?—From Barking Creek almost to Rainham Creek downwards.

471. Does it go upwards to Plaistow and those places?—No.

472. *Chairman.*] Will you state to the Committee what you believe is the effect of these marshes upon the health of the inhabitants?—The health of the town of Barking has certainly improved considerably within the last 15, 16, or 18 years. When I first came there, I found a very great deal of ague, particularly in the spring time of the year; but in the last 10 years we have scarcely had any ague, at least nothing to make mention of; there have been a few cases, I believe, in the district which I look after. That district contains a population

population probably of 10,000; I think, out of the 10,000, we have not had half-a-dozen cases of ague annually.

473. Have you had cases of remittent fever?—Very few indeed.

474. Sir *J. Shelley.*] How do you account for the change in the health of Barking the last few years?—In consequence of the great improvement which has taken place in the drainage of the Barking Marshes.

475. How has that been brought about?—It has been brought about by having additional sluices put down, by which means the water is carried off; the ditches are not full, and the ground itself is better drained; it is not swampy.

476. Has that been done by the Commissioners?—It has been done by the Commissioners.

477. Not by individuals?—Certainly not; there is a commission which sits at Ilford, which is within a few miles. A jury walks round the district at certain times of the year. I believe they walk round four times a year, and there are marsh bailiffs, whose duty it is to present anything they see in the marshes which requires attention. I believe the reason that we are so very healthy at Barking, is in consequence of the land lately being so much better drained.

478. As far as Barking is concerned, you have no special evidence to give against the drainage there?—No; only the state of the health of Barking some 20 or 25 years ago was very bad, and now in consequence of increased drainage, or a better state of drainage, the health of Barking is better.

479. How was the expense of that drainage paid?—It was paid on the level by scot per acre; the amount of expense has been very heavy upon the Barking marsh lands for the last 15 or 16 years. I know it unfortunately practically, being a marsh holder.

480. Mr. *M. Smith.*] Has not the charge been tantamount to the rent, and in some cases more?—In some years it was more. I had better have been without the property in some years.

481. Sir *J. Shelley.*] What is the average rental of marsh land?—I hold some marsh land at Barking, and also some in North Woolwich, exactly opposite the town of Woolwich. I have known marsh land adjoining to mine pay as much as 7 *l.* an acre; now it is not, of course, so much; the average, I should say, would be 50 *s.* or 55 *s.* in the Barking Marshes.

482. Are the Committee to understand that the extra expense by this improved drainage has amounted to something like 50 *s.* an acre?—I have not made any calculation of it.

483. I understood you to say that, in some instances, the charge for draining has exceeded the rent?—In some years it has been more than 50 *s.* an acre.

484. Supposing, in any given year, it has been over 50 *s.*, I presume the following year there has been a deduction to meet it?—I do not mean to say that the whole expense has fallen into one year.

485. I understood you to state just now, that you had more to pay in some years for drainage than you received for rent?—That has been the case, certainly.

486. *Chairman.*] Has that been the drainage for one year?—I have known instances where there has been sluice-work, which is very expensive work indeed, and then the expense has been more than the yearly rental.

487. That is expenditure for works in the nature of the expenditure of capital?—Exactly.

488. Sir *J. Shelley.*] Are the Committee to understand that the works of a given year are thrown upon that year?—I believe so.

489. If that be so, the following year, of course, there would be less expense?—Certainly. When I say that the expense has been much greater than the rental, I am speaking of years when probably there has been a very heavy piece of work done, such as laying down very expensive sluices, and repairing of walls.

490. If I understand you rightly, the expense has been thrown upon a given year; therefore, supposing that year happened to be the last year of a man's tenancy, he would be called upon to pay the expense, and the next tenant who came after him would reap the advantage?—It is a landlord's tax, and not a tenant's tax.

491. Mr. *Vansittart.*] You have said that the health of Barking has been much

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much improved; has the health of the marshes themselves improved also?—I do not believe there are 50 people in my district living in the marshes.

492. Is there anything peculiar, either in the ownership of Barking Marshes, or any other peculiarity attaching to those marshes, which accounts for the Commissioners being able to execute these new works of drainage?—I am not aware of any.

493. Are the Barking Marshes distributed among a great number of proprietors, or are there only a few?—There are a great many proprietors.

494. Are there any small proprietors?—Some hold half-a-dozen acres, and others will hold 150 or 200 acres.

495. You cannot account for the Commissioners of the Barking Marsh being able to execute these improvements, while other Commissioners cannot do so?—I do not know whether they cannot do what the Barking Commissioners do.

496. Is the consent of three-fourths of the proprietors necessary?—I am not aware of that.

497. Mr. *Wilkinson.*] Can you tell the Committee whether you have found the value of your lands improved to the full value of the expenditure upon the drainage?—I cannot tell you that; the average rent of marsh land in our neighbourhood, I suppose, is about 50 *s.* or 55 *s.*

498. That is the rent of the land after it has been well drained; did you get as much as that before it was well drained?—Yes.

499. Then that large cost has been money out of pocket?—Yes.

500. The only advantage has been the increased health of the district?—I, as a landlord, have not derived any advantage from it in a pecuniary point of view.

501. Sir *J. Shelley.*] I understood you to say there were only 50 people living in the marshes?—Yes; the town of Barking has probably 5,000 people living in it; that is, just upon the confines of it; what we term the uplands; there is no population, or very little, living in the marshes.

502. How are these Commissioners empowered to act?—I believe by Act of Parliament.

503. Can they do what they please, without any control from the scot-payers?—I cannot tell; I do not know what powers they have.

504. Mr. *M. Smith.*] Are not the Commissioners appointed by the Court of Chancery?—Yes; there are juries appointed by the Commissioners of certain levels, to go round the district.

505. Sir *J. Shelley.*] From what class of persons are those juries selected?—Generally from the respectable yeomanry and farmers. There is also an expenditor; a person who takes care of the financial part of the matter, and also a marsh bailiff.

506. Mr. *Wilkinson.*] Is there any large amount of undrained land in your neighbourhood?—There is not.

507. You are not able, from any experience of living in the neighbourhood of an undrained marsh, to tell the Committee to what extent the malarious influence reaches?—I am not; I consider that the Barking Marshes, and particularly the upper part nearest the town, are better drained than the generality of the marsh land.

508. Mr. *M. Smith.*] They were badly drained some years ago?—Yes; there has been a great expenditure in the neighbourhood of Barking the last few years.

509. Mr. *J. MacGregor.*] You say that you do not consider that your property has increased in value in consequence of improved drainage?—I have not received more rental; 25 years ago I know that the land let for 5 *l.* an acre, but in consequence of the peace the value of the land decreased.

510. Sir *J. Shelley.*] When the jury is called to determine upon the outlay of this money, and to charge the persons who are liable to the scot the expenses, are the persons so liable to be charged called before that jury, or have they any means of making counter statements in any way?—I am not aware; I have not attended any meetings myself.

511. Have you ever, as a landlord, been summoned before the jury when they have been about to assess the charge?—The jury do not assess it; they make a report to the Commissioners of what is necessary to be done. The jury in fact are merely parties who represent what is requisite to be done; they are not acting parties; they do not do it themselves.

512. Mr. *Wilkinson*.] The Commissioners assess the charge?—Yes.

512*. Sir *J. Shelley*.] The jury, I understand you to say, are the parties who state what should be done; is there any appeal against their opinion so given by those who are called upon to pay?—I never had occasion to go before the jury or the Commissioners.

513. You, as an owner of property, have never had a summons to appear before a jury, either to complain or approve of anything which they chose to say should be done?—Certainly not.

513*. Mr. *J. MacGregor*.] When you speak of the war, that is a period forty years ago?—I am speaking of 25 years ago, when probably leases that were taken during the latter part of the war were taken at very high rentals, and those leases had not expired. I know a person of the name of Twyford in our neighbourhood who was holding land at North Woolwich, and who paid 7 *l.* an acre to his landlord, Mr. Ismay, for it. I know he held it for several years after I came to Barking.

514. That had nothing to do with the drainage?—Certainly not.

515. Mr. *Wilkinson*.] When you say that the expenses charged for drainage exceeded the rent, you do not mean the expenses from year to year, but for some particular outlay; it is like a man draining his own land?—Yes.

516. *Chairman*.] The benefit of that outlay must be thrown over a series of years?—Yes.

517. Mr. *M. Smith*.] Have you been dissatisfied with the outlay, and made complaints in consequence?—I never have.

518. Sir *J. Shelley*.] Have you found upon the average of years that the money so expended has been profitable to you by increasing the value of your property?—I have never found it so; I naturally expected it would have been; some years it is more than the rent, and some years less. I believe doing this heavy work may have saved me an annual outlay.

519. Mr. *Wilkinson*.] I understood you to say that, in your opinion, the money expended upon drainage had not added anything to the value of your land?—Certainly, it has not.

520. Is your land let upon long leases?—No, it is not.

521. So that from year to year you have the opportunity of getting the advantage of the market price?—Yes. When I say "my land," although I am in possession of it, it was held before me by my father-in-law; he was the occupier and the landlord as well.

522. Mr. *J. MacGregor*.] How long has it been in your possession?—Four or five years.

523. Sir *J. Shelley*.] You, as an owner of marsh land, are satisfied with the way in which the drainage is conducted?—I never complain; I find I only pay as much as my neighbours.

John Hayward, Esq., called in; and Examined.

524. *Chairman*.] DO you reside at Dartford?—Yes.

525. Are you Clerk to the Commissioners of Sewers for the limits extending from Lombard's Wall to Gravesend Bridge?—Yes.

525.* How long have you been so?—Twenty-five years.

526. Mr. *M. Smith*.] Gravesend Bridge, I suppose, means Northfleet?—The description in the commission is, from Lombard's Wall to Gravesend Bridge. We do not know Gravesend Bridge.

527. *Chairman*.] What is the date of that Commission?—The 30th of June 1853; that was the renewal of commissions which have existed 200 or 300 years.

528. Under the 23 Henry 8?—Yes; the commission expired, and then there was a renewal; it issues from Chancery, and is directed to persons named by the Lord Chancellor and Chief Justice, &c., &c.

529. What is the number of Commissioners?—There are 95 in this Commission.

530. How far do they reside one from another?—Thirty-nine reside within a distince of three miles of the marshes; 29 reside beyond three miles and within six miles; and the remainder in different parts of the county, but beyond six miles.

531. How many have qualified under the present Commission?—Thirty-six have qualified under the present Commission.

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532. Can you give the attendance of the Commissioners and the number of their meetings?—The average attendance of Commissioners for the last five years has been eight or nine Commissioners.

533. They are unpaid Commissioners, are they not?—Yes.

534. What has been the average number of meetings during the last five years?—About six in each year.

535. Sir *J. Shelley*.] Are the Commissioners paid travelling expenses, or anything of that sort?—No; I believe an outlay of 25 *l.* a year will cover their expenses.

536. *Chairman*.] Can you give any information as to the meetings of the Commissioners?—The Commissioners hold three meetings in each year, at which they make a personal survey of the whole of the levels.

537. Attended by their officers?—Attended by their surveyor, who is a permanent paid surveyor, whose whole time is occupied in the service of the Commissioners; by the clerk, and by the expenditor. They visit each of the levels, and see the state of each of the levels as they pass along.

538. Sir *J. Shelley*.] Do they hear complaints at that time?—Before each meeting the Commissioners send a circular to every occupier of land upon the level, giving him notice of the hour at which they will be there, and requesting him to make any complaints or suggestions.

539. Is the occupier the person to pay the expenses which may be laid on, or the owner?—In many instances the occupier, and sometimes the landlord.

540. Does the landlord have notice?—No; only the occupier.

541. In the instances in which the landowner is liable to pay, is the notice sent to him or to his tenant?—The Commissioners do not know who pays; the tax is levied upon the occupier, and whether he claims it over again, they do not know. In reference to a question which was put to a former witness, it is quite clear if the occupier is the tenant under the fag end of a lease, or at any time during the lease he had covenanted to pay the scot, the levying of the whole amount falls upon the occupier, and not upon the landlord. Your observation had also this tendency: that the expense was not distributed over a certain number of years; the Commissioners have no power to extend beyond one year, except they borrow money under the 3d & 4th of William the Fourth, under the powers of that Act; that they can only do with the consent of three-fourths of the owners and occupiers.

542. Under the powers of the Commissioners, it is the fact that upon a great work being done in any given year, they cannot spread the cost over the average of years, but they are obliged to charge the expense of that work to the year in which the expenditure takes place?—Precisely so, unless they raise money by loan or take money up under security under the powers of the Sewers Act, the 3d & 4th of William the Fourth; then they have power to distribute over 14 years.

543. When any great work has been undertaken, has it been usually paid for by money borrowed, or has it been paid for by scot payable that year?—By scot payable that year; we have never borrowed any money.

544. The fact is, as I stated before, that a tenant at the end of his lease might be called upon to pay a heavy scot for works which must be beneficial to the next tenant over an average of years?—No doubt that is the effect of it. I think I might say that the Commissioners are quite impressed with the conviction, that if they could raise a large sum of money at once, and extend it over a period of 14 years, under the Act of Parliament, it would not only be great economy, but it would work a great justice to the parties who have to pay it. In 1847 the whole of the district was surveyed by Mr. Easton, of the firm of Easton & Amos, the engineers, and he made a minute calculation of the outlay which would be required at once to put these levels into a perfect state, and by that there would have been a very great saving, if it could have been done. The Commissioners have not the power to do it without the consent of three-fourths of the owners and occupiers, which never could be obtained.

545. If any scheme could be devised by which the payment of these large works could be extended over a great number of years, in your opinion would not that be beneficial to the interests of the district, and do away with a great

deal

deal of complaint of want of consent?—No doubt. Throughout the whole of this district there are sewers, called common sewers, which are under the immediate control of the Commissioners, who by their officers cleanse those common sewers; those common sewers communicate with sluices, which run through the Thames bank into the Thames. In the marshes there are also a number of ditches which are termed private ditches, and in those private ditches the owners claim an easement or right to pen up the water, not only for the purpose of fencing the land, but also to form watering-places for the cattle. No doubt they make use of these banks to continue a system which they believe to be beneficial to the land, but which is no doubt not so. The Commissioners are quite impressed with the belief that a better system of drainage would be greatly beneficial to the land. The Commissioners feeling the difficulty of never having interfered at all with these private ditches, caused the opinion of eminent counsel to be taken upon the subject. It was well considered, and they were of opinion that the Commissioners could not interfere with those private ditches, unless they executed new works, and the interference followed as a sequence upon the execution of those new works; but those new works, it is quite clear, cannot be done without the consent of three-fourths in value of the owners and occupiers.

546. Is it your opinion, that if the Commissioners, who have the command of the outfalls and sluices into the Thames, and the larger common sewers, had also the command over these private ditches, it would have the effect of materially improving the drainage of the district generally?—I am sure it would. The Commissioners are quite anxious to carry out a system of drainage.

547. *Chairman.*] Had the Commissioners of Sewers, in 1847, the district between Erith and Woolwich surveyed?—Yes, by Mr. Easton.

548. Were the levels taken and laid down?—The levels were taken, and laid down upon the sewers map, with a view to better drainage.

549. Did Mr. Easton report upon the subject?—Yes, he did.

550. Sir *J. Shelley.*] At the time when these personal surveys are made, do you attend those surveys?—Yes.

551. Can you tell the Committee whether there have been generally complaints made to the Commissioners at those times?—I do not think, during the 25 years I have been clerk to the Commissioners, that a dozen occupiers have ever attended the Commissioners upon the survey at all.

552. Nor owners either?—Nor owners either; there have been, in a few instances, complaints made by Mr. Russell, the gentleman who has been examined.

553. *Chairman.*] Did the Commissioners take legal opinions with reference to the consent of owners and occupiers?—Yes; as to its being necessary.

554. And they were advised that they had not that power?—Yes.

555. Mr. *Wilkinson.*] Supposing you had power, do you think you would get the consent of the majority of the owners and occupiers to any such alteration as you propose?—That would of course facilitate it.

556. Do you know the state of opinion amongst them, so far as to enable you to judge whether you could get the consent of the majority?—The district is subdivided into a great many ownerships; it is difficult to get persons to act concurrently in a matter of this sort; I should say you could do so.

557. Sir *J. Shelley.*] Would it not very much facilitate the probability of getting the consent of the majority of owners and occupiers, if the power was given to the Commissioners to throw the expenses of permanent works over, say seven or 14 years, instead of their being thrown into one year; does not the fact of a heavy expenditure staring a man in the face, more particularly if he is only a yearly tenant, make him very little inclined to allow such an expenditure to take place?—No doubt.

558. Would not a man be more likely to give his consent to any large expenditure for the purpose of drainage, if he saw that he would have to pay an average expenditure so long as he occupied the land?—He would be more likely to consent, no doubt.

559. Mr. *Wilkinson.*] Have the Commissioners the power to spread the expenditure over 14 years?—Yes, if they borrow money; but they have not done so.

560. Sir *J. Shelley.*] I understood you to say, that when the expenditure is by rating or scot, it must be paid in one year?—Yes.

561. If a large expenditure takes place, and they wish to defray it by raising

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a loan, they must have the consent of three-fourths of the owners and occupiers?—Yes; they must have the consent of three-fourths in value. There would be difficulty in borrowing money under the borrowing clauses, because there is no conclusive data upon which you can satisfy the lender that he has the consent of three-fourths of the owners and occupiers.

562. Mr. *M. Smith.*] Supposing it was thought right by the Commissioners to place the whole of the private ditches which run into the common sewers under the Commissioners, and to take them out of private management, is there not a power under the Sewers Act, with the consent of any proportion of the owners of land, to effect that object?—Yes; with the consent of three-fourths.

563. Colonel *Dunne.*] Does that mean the consent of three-fourths of the owners in fee?—"Three fourths of the owners and occupiers in value;" those are the words.

564. Sir *J. Shelley.*] How do you get at the occupier at all, except as the representative of the owner?—We find the occupier in possession of the land, and we levy the scot upon his land.

565. Should you seize the occupier's property if you did not get it paid?—We should seize any property upon the land. There is power to sell even the fee-simple itself, in the event of there being no sufficient distraint.

566. Colonel *Dunne.*] In the first instance, when the consent of three-fourths is required, is that of the owners or the occupiers whom you find in possession?—Both.

567. You must have both?—We must have the consent of three-fourths of both owners and occupiers.

568. How is the value estimated?—There are no means provided by the Act by which the value is ascertained; that would be, if provision were made to raise money, a most impracticable thing.

569. Practically, when it is done, a tax is levied with the assent of three-fourths, which, I understand you to say, binds the minority; how do you ascertain the value in the cases of those who do not give an opinion?—You must do it in the best way you can; there is no mode pointed out, and I cannot conceive a lender to be at all satisfied.

570. Therefore, in any Bill to facilitate the drainage of these marshes, it would be requisite to define how the value was to be ascertained?—It would be very desirable to have the certificate, which should be declared to be final as regards the value.

571. Is there any valuation for the poor rates?—Yes.

572. Would that answer the purpose?—It would not, because in raising money, the security depends upon the consent of three-fourths. The security would not merely be affected, as in a common mortgage, by the value of the property; but this security is not good unless you have the consent of three-fourths.

573. Sir *J. Shelley.*] Have you had any difficulty in obtaining the consent of three-fourths of the owners and occupiers?—We have never actually urged it; I am speaking from my general knowledge of business.

574. Colonel *Dunne.*] This want of ascertaining the value is found to be a hindrance to the working of the Act?—Yes, when it comes to the point.

575. Sir *J. Shelley.*] The great thing would be to guarantee the security which you have to give, in order to raise money on good security?—Yes; there is a power under the Drainage Act, and there a certificate is conclusive.

576. Do you consider that the powers which are given under the Drainage Act to the Inclosure Commissioners would be satisfactory and sufficient as regards these marshes?—I think, if the Sewers Commissioners had similar powers, they could do all they were required to do.

577. The powers of the Inclosure Commissioners, after having by their surveyor ascertained that the outlay will be repaid by the increased value of the land, being to grant a certificate, which is a good security to any lender, do you consider that in the case of these Sewers Commissioners, as regards these marshes, that would be what is required?—I do. If I were left to suggest the means of getting out of the difficulty, I think, if the Commissioners were empowered to do new works, unless three-fourths, or any stated number, objected after notice which might be prescribed, that would very materially do away with the difficulties.

578. Colonel *Dunne.*] Supposing three-fourths of those who assented were occupiers

occupiers alone, would that bind the owners as completely?—The words are in the conjunctive, "owners and occupiers."

579. Sir *J. Shelley.*] There must be the consent of three-fourths of the owners, and three-fourths of the occupiers?—Yes.

580. Colonel *Dunne.*] One-fourth of the owners and three-fourths of the occupiers would not bind the minority?—No; reference has been made to the report of Mr. Easton. I find I have his last report, made December the 8th, 1853, when this question was mooted. The Commissioners then directed Mr. Easton to make a re-survey, and further to report to them his opinion.

[*The same was read, as follows:*]

To the Commissioners of Sewers of the Dartford and other Levels.

Gentlemen, Grove, Southwark, 8 December 1853.

Having received instructions from your clerk, Mr. Hayward, to make a report and estimate of the expense of effectually draining the marshes or low lands between Woolwich and Erith, I have caused the levels to be taken, to ascertain the heights of the present sluices above low-water mark, and collected other information that will enable me to comply with the instructions.

I find that low-water mark, on the 1st and 2d instant, was about—

4 feet	below the	Green Level Sluice.
6 feet 2 inches	below the	Great Breach Sluice.
3 feet 8 inches	„	Abbey Level.
6 feet 6 inches	„	Old Corn Marsh.
5 feet 6 inches	„	Crab Tree.

The land in Green Level being higher than that in the other levels, it can be drained through the present sluice.

I should recommend a new sluice to be placed in Great Breach Level, about five feet lower than the present one.

In Abbey Level I should fix a new sluice, about two feet, or two feet six inches lower than the present one.

A new sluice should also be placed in Old Corn Marsh Level, five feet lower than the present one, and through this I would drain most of Church Level, a small portion of Abbey Level, which is very low and near the sluice, and also that part of Crab Tree Level east of the Griffin Manor-way.

By placing the sluices in this way, and diverting a portion of the drainage from Abbey Level, it will be seen that the water would be taken to the Thames, from the uplands, by a shorter route than if allowed to pass through Abbey Level, as it now does.

The putting down of the three new sluices, and sinking the whole of the main drains to a proper level, to admit of thorough draining being adopted in all the levels, I estimate at 1,680 *l.*

I should recommend that the whole of the private ditches, except those that can be filled up, be sunk to an average depth of two feet below their present level, which could be done at a cost of about 1,560 *l.*; and I am of opinion that it would be much to the interest of both landlords and tenants if a proper arrangement were made, and these ditches taken into commission, because they could then be kept clean and a proper supply of fresh water given for cattle, without the interference of any of the occupiers.

The fresh water must be supplied, I find, in a similar manner to what I recommended in my report, dated December 1847, but at two feet lower level, and this alteration I estimate at 160 *l.*

The alteration made in the level of the fresh water in the ditches would involve the necessity of making drinking places for the cattle, and I am of opinion that 200 *l.* would make all that would be wanted.

If the whole of these works were to be carried out, the cost, per acre, for all the levels, would be under 25 *s.*, the total amount being 3,600 *l.*, and the number of rateable acres 2,923.

I have measured the length of the ditches in the levels, as shown on the plans, and find them to amount to 141,980 lineal yards; and, taking them at an average width of seven feet, the area would be equal to 68½ acres, and of this extent I find we could stop up 12¾ acres without any exchange of property. But if the whole of the levels were the property of one landowner, a very much larger number of ditches could be done away with.

I was glad to learn, while collecting information for making this report, that ague had very much diminished since you carried out the works recommended in my report of December 1847, for lowering the main sewers, and for improving the supply of fresh water to the levels.

Should the plan here suggested be carried out the whole of the levels could be thorough drained, which would not only improve the district in a sanitary point of view, but would, I am confident, from my experience in thorough draining, pay the landlord and tenant together from 10 to 15 per cent. for the money expended.

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There is one other subject to which I must beg to draw your attention, viz., the sewage and drainage of the new town now growing up between Plumstead Common and the railway, which is now taken along the railway into the Crab Tree Level. This is but very little, if any, nuisance at this time, but it will become worse every year, as the town increases; and therefore I think it right to draw your attention to it, the more particularly as I am not certain at whose expense it ought to be conveyed into the Thames without going into the level, which could be done at a cost of from 1,600 *l.* to 1,700 *l.*

I think, however, that you ought not to be called upon to do it, and, therefore, the question would rest between the North Kent Railway Company and the proprietor of the land on which the town in question is growing up.

I have, &c.
(signed) *James Easton*, for Self and Partner.

581. Sir *J. Shelley.*] What was done upon that report?—Upon this report a meeting was called; a circular was sent to each landowner and each land occupier, giving notice that a meeting of the Commissioners of Sewers would be holden very shortly after that date at Dartford, at which they would present before them a system of drainage throughout the district from Woolwich to Erith, and that they would be solicited to give their assent. The meeting was attended numerously. Mr. Easton was there, and he produced his plan, and explained the mode he had of doing this drainage; it resulted in the consent being signed by five persons as owners, two of them being Commissioners themselves, and one occupier; there the matter has remained, and there have been no active steps taken since that meeting.

582. At that meeting was any objection made to the plan, or were any doubts mentioned by any owners as to the effects to be produced?—No; there was a long discussion, but there appeared to be no objection; it appeared to die away from inanition.

583. Were they frightened by legal expenses, or anything of that sort?—No; I think it arose from indisposition to move. I may state, that the Commissioners have never taken an active part in urging any specific plan of drainage; they have felt as a public body, as a court of sewers, that they were persons who might be called upon to decide upon a particular measure, and therefore they have always stated to the owners and occupiers, "We are quite willing to do this; we only want your request to do it."

584. In point of fact, the Commissioners are not pecuniarily interested?—Many of the Commissioners are owners of marsh land.

585. Are the eight or nine Commissioners who are in the habit of attending constantly principally persons residing on the spot?—They are persons residing within six miles, and some of them are owners.

586. Are they tradesmen in the town?—No; the Commissioners are magistrates in the county, clergymen, and persons of property.

587. Colonel *Dunne.*] At whose instance was the first survey made?—It was made at the instance of the Commissioners.

588. The Commissioners have the power of the initiative?—The Commissioners have the initiative, but they felt they were not the persons to do the work, except upon the application of the owners and occupiers.

589. Did they commence the initiative at the instance of persons connected with the neighbourhood, or in their function as Commissioners?—In their function as Commissioners; they themselves are aware of the importance of this drainage, and they have on that account given every facility for effecting it.

590. Sir *J. Shelley.*] Is there a chairman of the Commissioners elected?—Not a permanent chairman; he is elected at each meeting.

591. Has it been the habit to elect one gentleman particularly, or has it happened so?—Generally the senior Commissioner is the chairman.

592. Is there any one gentleman who has taken a more prominent part than the others?—Mr. Tasker, at Dartford, has taken a very active part.

593. Colonel *Dunne.*] Before assembling the meeting to which you have referred, did the Commissioners form an estimate of the plan for the reclamation of these marshes?—Upon the survey, each year, they are attended by their surveyor, who is a paid permanent officer, by the clerk, and by the expenditor; they then inspect the work which has been done during the previous year; and the expenditor produces to them, as they go along, an estimate of the work required for the forthcoming year.

594. None of those expenses are thrown upon the locality, because the preliminary surveys are made by a paid officer of the Commissioners?—Yes; but that officer is paid out of the scot levied by the Commissioners.

595. Supposing the occupiers reject the plan, who pays for the survey?—It is paid out of the money raised by the scot.

596. There is always a scot?—Yes, for the repairs; the material outlay is for the repair of the Thames Embankment.

597. Sir *J. Shelley.*] I presume there is an audit of the accounts?—Every year, after the survey is made, the Commissioners hold an annual meeting, at which they pass the previous year's accounts of the whole of the levels, and any one may attend, if he thinks proper. They then make an estimate of the cost for the forthcoming year, and direct the warrants for the levying of scots to be prepared; and then, at a subsequent meeting, the warrants are issued. The books are open for the inspection of any landowner or occupier.

598. Colonel *Dunne.*] When was the Commission first issued?—The Commission is of very old date; it was renewed in 1853.

599. When was the tax first imposed?—By the statute of Henry the Eighth, or even before that. That was the statute which consolidated the Commissioners.

600. When an estimate is laid before a meeting, and three-fourths of the owners and occupiers accede to it, are the Commissioners bound to execute the works at that estimate, or if they exceed the estimate, have they the right to levy a rate?—They have the right to levy whatever the works cost.

601. If the owners and occupiers accede to the expenditure of a certain sum, can the Commissioners of their own authority exceed that sum?—Yes; the Commissioners levy the amount; the consent of the owners and occupiers is to do the work.

602. It does not limit the amount?—No.

603. Mr. *M. Smith.*] Is it the custom of the Commissioners to call the expenditor before them to ascertain the probable outlay which will be required, and then to levy a scot in accordance with his report?—In our district the surveyor makes the estimate; the expenditor is always present.

604. The Commissioners have an estimate of the expense which is necessarily to be incurred for the ensuing year, and then they lay on a scot in accordance with that amount?—Yes.

605. Sir *J. Shelley.*] Supposing that estimate to be exceeded, as estimates generally are in all large works, am I to understand you to say that the Commissioners have the power of increasing the scot to meet that excess of expenditure?—Yes; in the following year the scot would be increased.

606. What appeal have the scot payers against that outlay?—Their only appeal would be to the Commissioners themselves.

607. To the persons who lay out the money, in effect?—Yes.

608. There is no appeal by the scot payers, except by sending a complaint to those who are laying out the money?—Exactly.

609. There is no court of appeal beyond them of any kind?—No.

610. Colonel *Dunne.*] Therefore the effect would be, that the Commissioners might lay out any sum which they thought necessary without actually any appeal against them?—Yes.

611. Sir *J. Shelley.*] Is it not possible that a landowner, or any number of landowners, seeing the powers which the Commissioners have, may be very unwilling to give their consent to any large outlay, even upon the estimate of a respectable man like Mr. Easton, for fear it should be exceeded, and they might be liable to be mulcted in any amount of expenditure?—No doubt.

612. Mr. *Wilkinson.*] Does this Commission extend to the whole of the marshes?—It includes the marshes between Woolwich and Erith.

613. Does that form a considerable portion of the marshes?—Yes.

614. I understood you to say, that the Commissioners have not entire power, without any consent of the owners and occupiers, to lay out money to effect these improvements?—No; they cannot interfere with the private ditches, which is the source of the whole grievance.

615. Sir *J. Shelley.*] Supposing that by this Committee, or by any means, Parliament were to do anything to give additional powers to the Commissioners, do not you think it would have a good effect as regards the consent of owners and occupiers to those large outlays, if there were some court of appeal to

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which they might refer in the event of the Commissioners exceeding any estimate, or any amount of expenditure to which they had given their consent? —I think a power of that sort might be advantageous.

616. *Chairman.*] Do not the Commissioners consider themselves as trustees, and having power under their trust they are quite ready and anxious to carry out those powers upon an application from the parties concerned?—Precisely so.

617. Is not the district divided into a great many ownerships and occupierships?—Yes, a great many.

618. Is not that one great reason, or the sole reason, of the difficulty which arises from the want of the consent of three-fourths of those owners, and three-fourths of those occupiers?—Yes.

619. Mr. *Wilkinson.*] I understood you to say, that consent was only required in the case of the Commissioners being obliged to borrow a sum of money?—It is required in the case of all works that would come under the denomination of new works.

620. Even if the cost of those works could be repaid within a year?—Yes; the Commissioners could not cut one yard of new ditch without the consent of three-fourths of the owners and occupiers.

621. Have you any doubt, looking at that report which you have had in your hand, that if those techical difficulties could be removed, these marshes could be drained with benefit to all parties concerned?—My confidence in Mr. Easton's Report is such, that I quite believe that result would follow.

622. *Chairman.*] You quite agree with Mr. Easton's Report?—I do; I form my judgment upon it. I do not profess to have any personal knowledge of the subject.

623. Mr. *J. MacGregor.*] The state of the law does not allow the Commissioners to act?—It does not allow them to act efficiently.

624. Colonel *Dunne.*] Are not all the Commissioners either connected immediately or by some local interest with these marshes?—There are a great number of them that have no interest in the property, and a great many have no local interest.

625. Are they not generally persons residing in the neighbourhood?—Yes.

626. Have not they advantages as Commissioners over any central Board or Government authority, so far?—Yes.

627. You would recommend that the Commissioners should be chosen from the locality; you would not suggest any alteration in that respect?—I should not.

628. Mr. *M. Smith.*] Are not a great many of the Commissioners owners of marsh lands?—Yes.

629. Mr. *J. MacGregor.*] You have mentioned the total number of gentlemen whose names are in the Commission?—Yes, 95.

630. Of those only 36 have qualified?—Yes; I may say that many of the Commissioners are official persons; for example, the Lord Lieutenant.

631. Of the 36 who have qualified, only nine have attended the meetings? —I say, on an average of attendance, there are eight or nine at every meeting; the whole of the 36 have attended some meeting or other.

632. Since 1853?—Yes; some of these 36 have attended each meeting.

633. You as their clerk entertain no doubt that if legal authority were reposed in them to effectually drain these marshes, that could be done?— Exactly so; that is my belief.

634. Sir *J. Shelley.*] What is the qualification of the Commissioners?—There are a variety of qualifications under the last statute. The qualifications are thus described in Mr. Woolrych's Treatise on the Law of Sewers, page 20: "With respect to the qualification by estate, considerable alteration has been made by the statute of 3d & 4th of William the Fourth, chapter 22; that statute enters fully into the qualification of future Commissioners, leaving untouched, however, the qualifications of such as had acted as Commissioners under Commissions then existing. This Act of William recognises the 23d of Henry the Eighth, chapter 5; the 3d & 4th of Edward the Sixth, chapter 8; and the 13th of Elizabeth, chapter 9; and then goes on to provide that no person who has not already acted as a Commissioner under any Commission of Sewers already issued, shall be qualified or capable of becoming or acting as a Commissioner in the execution of any Commission of Sewers, unless such person shall be in his own right, or in right of his wife, in the actual possession or receipt for life, or for a larger estate, of the rents and profits of lands, tenements, or hereditaments, situated in the county in which he shall act as a Commissioner,

missioner, or in any adjoining county, of freehold or copyhold tenure, or held for a term of not less than 60 years absolute or determinable, with a life or lives, of the clear yearly value of 100 *l.* above reprises, or held for a term of years originally granted for not less than 21 years, and of which 10 years at the least shall then be unexpired, of the clear yearly value of 200 *l.* above reprises, or shall be heir apparent of a person possessed of freehold or copyhold lands, tenements, or hereditaments situated in such county as aforesaid, or in any adjoining county, of the clear yearly value of 200 *l.* above reprises, or unless such person shall be the agent duly appointed by writing, under the seal of any body politic or corporate, or under the hand of any person not being himself present, and acting as a Commissioner in the execution of the Commission of Sewers, under or by virtue of which such agent shall act, and which body politic or corporate shall for the time being be in the receipt of the rents and profits of freehold or copyhold lands, tenements, or hereditaments situated in such county as aforesaid, or in any adjoining county; and which person making such appointment shall for the time being be, in his own right, or in right of his wife, in the actual possession or receipt of the rents and profits of freehold or copyhold lands, tenements, or hereditaments situated in such county as aforesaid, or any adjoining county, and which lands, tenements, or hereditaments, whether so belonging to such body politic or corporate, or to such other person, shall be actually taxed under or by virtue of the Commission of Sewers, in respect whereof such agent shall act, and shall be of the clear yearly value of 300 *l.* above reprises, or unless such agent shall, before he acts, deliver his written appointment to the clerk to such Commissioner of Sewers, or his deputy, to be filed by such clerk among the records or proceedings of the Commissioners acting in the execution of such Commission: Provided always, that in cases where Commissions of Sewers run into more than one county, the qualification hereinbefore provided may be situated either partly in each of the counties into which such Commission shall run, or wholly in any one of such counties; provided that nothing in this Act contained shall extend to give a qualification to any other person as agent after he shall have ceased to be such agent."

635. Colonel *Dunne.*] By whom are the Commissioners appointed?—The Commissioners are appointed under a commission issued out of Chancery.

636. Is there any Act of Parliament applicable to the case of these marshes, or do the Commissioners exercise their functions under the general Act for the whole country?—There is no private Act with reference to these marshes; the Commissioners work entirely under the public Act.

637. Mr. *M. Smith.*] Under an Act commonly called "Hodges' Act"?—Yes.

638. Mr. *MacGregor.*] That was only for continuing the powers of the Commissioners for a certain period?—That was for increasing their powers; one of the points of "Hodges' Act" was to give the Commissioners additional powers, with the consent of three fourths of the owners and occupiers. Before that time the Commissioners could do no new works whatever. Then came "Hodges' Act," which said, "You shall have power to do new works, but we will give a controlling power to the owners and occupiers to the extent of three-fourths of the value."

639. Your suggestion would be for the extension of Hodges' Act?—If that controlling power were taken away or modified, the difficulty would be removed.

640. Sir *J. Shelley.*] Do not you think that the difficulty of obtaining the consent of three-fourths of the owners and occupiers to any work which might be thought necessary by the Commissioners, would be likely to be reduced, provided there were an appeal to some such body as the Drainage Commissioners, or the Inclosure Commissioners?—I think it might be lessened; I would rather suggest that the Commissioners should have power to execute works, unless three-fourths dissented.

641. Does not that amount to the same thing; in that case due notice must be given to every owner and occupier, who would have to send in his assent or dissent before a certain day, and he would simply write his dissent, without inquiring into the question?—I do not know whether, practically, that would be the case.

642. Mr. *Wilkinson.*] Do you mean that assent should be assumed unless a

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dissent were given?—Yes: I think many of those owners and occupiers do not like to say "Yes," or "No;" but they would be perfectly satisfied if the work were done.

643. Mr. *J. MacGregor.*] You have heard the sanitary evidence which has been given, to some extent?—Yes.

644. Do you concur in that, so far as your general observation goes?—I am not much in the marshes, but I have no doubt that an improved system of drainage anywhere must improve the sanitary condition of the neighbourhood.

645. Sir *J. Shelley.*] One of the witnesses has stated that some of the sluices or some of the ditches were dammed up by order of the Commissioners; is that correct?—I can explain that in this way: Mr. Russell is one who has always advocated a better system of drainage; he has laid out a large sum of money in under-draining the whole of his marsh land; and the Commissioners, being desirous of promoting his views as far as possible, would have lowered the ditches, so as to enable him to under-drain his land; but then when they came up to a certain point, they could not interfere with the private ditches, in which there has been a pen of water; instead, therefore, of lowering the ditches the whole length of Mr. Russell's land, they put a dam here. Then, with reference to the sluices, those are self-acting sluices. I did not quite understand Mr. Russell. Every sluice has a flap to it, which is a self-acting flap, and the outlet is cleansed and discharged by itself, upon the subsidence of every tide; no salt water, throughout the whole of the levels, is admitted.

646. Is there not some expense in looking after these flaps?—The surveyor of the Commissioners is the man to whom, in the first instance, they are entrusted, and then he has under him two or three other persons whose duty it is to see daily to these sluices.

647. Can you state whether there has been any complaint, where the ditches have been lowered in that way, of the stock getting across, when the water has been let out, into other people's land, or into the arable land?—The ditches have never been so lowered.

648. Has that been one of the reasons given?—That may be one of the reasons stated, but I do not think it is a valid reason; I think the ditches, though deepened, would form a sufficient fence.

649. Mr. *M. Smith.*] Mr. Bossey stated that there was a considerable leakage from the Thames, and that the banks admitted salt water to the marshes?—I read that in his evidence, and I felt satisfied that the statement proceeded from misapprehension on his part, because the principle is that there is not one atom of salt water admitted throughout the whole district; and if there has been, it is quite an accident, and could not have gone beyond a day, because these sluices are superintended every day.

650. Colonel *Dunne.*] Even the neglect for a few hours would not affect it to any material extent?—It might, because it would let the reflux water in, and prevent the marsh water from the high grounds getting away.

651. Sir *J. Shelley.*] Mr. Bossey gave evidence that it had an injurious effect upon the stock, as if the cowkeepers thought a rush of salt water had the effect of spoiling the drinking water, and deteriorating their crops, and thus damaging their property; do you believe that he is mistaken as to there being any quantity of salt water admitted?—Within the last 25 years there has been no oozing of salt water through the Thames embankment; I cannot accede to that. The object of the Commissioners is to keep the salt water out, I may say, within the period I speak of; except in one or two instances, the Commissioners have had no breaches in the walls.

652. How is the surveyor paid; is he paid by salary, or by fees, or expenses?—By a stated salary.

653. How much a year?—A hundred pounds a year.

654. Is he paid any extras?—None whatever.

655. Has he any interest in the outlay which takes place?—None whatever.

656. He is not a contractor, or has he anything to do with the work?—No.

657. Mr. *M. Smith.*] Is there one uniform scot all over the district?—No; the scot varies very much.

658. Sir *J. Shelley.*] How long has a surveyor been employed?—He has been upon the walls now these 30 years.

659. Mr. *Wilkinson.*] Does it occupy the whole of his time?—Yes. When Mr. Easton made his report he gave a very satisfactory account of the state of the

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the whole of the walls; he went minutely into calculations as to the way in which the work was done.

660. Sir *J. Shelley.*] I presume the surveyor has a number of men employed under him?—Yes.

661. To what extent?—It varies very much; there is a great deal of work done.

662. Has he sometimes 50 or 60 men?—Not so many as that; 20 or 30.

663. Mr. *J. MacGregor.*] Although Mr. Bossey was wrong about the admission of salt water into the marshes, is there any doubt that the private ditches are in a most disgraceful state, generating malarious effluvia, which is perceptible to the most common observer?—I have noticed them.

664. Colonel *Dunne.*] Is there any power in the Commissioners when they see the private ditches in a dangerous state to compel the owners to repair them?—No.

665. Would not such a provision be advantageous?—Yes. In one of the levels, the Stone Great Level, which is a small level, in the year 1851 or 1852, the Commissioners having the consent of three-fourths of the owners and occupiers, put down a new sluice at a lower level, and the benefit throughout the whole of that level since has been found very great. One gentleman gave evidence about the juries. I think that you will find that the duty of a jury is to present the persons who are liable to pay the scot, and it is the duty of the Commissioners to assess the amount. Under Hodges' Act the presentment of the jury is dispensed with, except at the first meeting of each new commission, and then a jury is summoned, and evidence is given to them of the ownership and occupiership of the lands, which either receive benefit or avoid damage by the works done, as a general benefit or avoidance of damage; that presentment being made exists through the whole of the Commission.

Robert Westley Hall Dare, Esq., called in; and Examined.

R. W. H. Dare, Esq.

666. *Chairman.*] YOU are a large proprietor in the neighbourhood of the marshes?—Yes, in the parishes of Rainham and Wennington. I am also a Commissioner of Sewers acting in that district.

667. Have you paid considerable attention to the plan of draining the land in those marshes?—Considerable attention.

668. What has been the result of your experience?—The result of my experience of the agricultural state of the marshes is, that drainage is exceedingly wanting. I speak not only of these marshes, but of the lands both east and west, as far as Barking and as far as Grays. A great portion of the lands between Rainham and Barking are under arable cultivation. I have frequently known a crop of potatoes to be twice planted and twice flooded in a year. Within the last three years I have also known the same accident to happen to crops of wheat, yet, in spite of that, the produce of everything that has not perished by the water is of the most magnificent description; it is land which is capable of growing wheat and potatoes (if the disease does not take them) alternately, without intermission and without manure, for any number of years.

669. Sir *J. Shelley.*] Do not you mean wheat and root crops?—Wheat and potatoes, while potatoes existed; the grazing lands also are of a very fine description, but they are very much intersected by low places. I have observed that there a great many old intersecting walls and high places which have been formed at different levels by the deposit of the river. In all cases in which the evel is higher the grass is finer and of a more fattening quality. In many cases those high places are as much as eight feet above the level of the water, and I feel therefore justified in concluding that if the waters were reduced over the whole levels to a proportionate depth below the general surface, the quality of all the grass would come to the same pitch as it now is upon those isolated spots.

670. Has there been any attempt to introduce a general system of drainage, so as to make it feasible to work the land to any advantage?—There have been various attempts at drainage by the Commissioners. I must observe, upon the evidence which has just been given, that whether in consequence of the personal trust which was reposed in the Commissioners, or from whatever other cause, the Essex Commissioners have, on several occasions, had no difficulty in

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borrowing money for making extensive improvements in the outfalls of the district, of course with the consent of three-fourths of the owners and occupiers as required by law. I am quite aware of the existence of the difficulties which Mr. Hayward feels; I believe them to be legal cavils, which as such are quite justifiable; but we have succeeded in borrowing from a provident society and from other sources sufficient money to make outfalls in the Rainham Level, and also in other levels under the same Commissioners, under what is called the Rainham Commission.

671. Is that under Hodges' Act?—Yes.

672. Then in the instances to which you allude, the lenders have not complained of want of security?—I presume they have not complained of it; certainly they have been punctually paid. I attribute it more to the opinion they have of the character of the Commissioners personally; they felt that they were dealing with gentlemen. I think it is extremely probable that they may not have closely investigated the securities; it is certain that flaws do exist in the security, and it is most desirable they should be removed.

673. *Chairman.*] Have you drained a good deal of land yourself?—I have considerably improved and lowered the internal ditches on a good deal of my own land, and land the property of my mother's trustees, so as to gain the greatest possible advantage from the existing outfalls. But I have not yet completed that which I am in the course of constructing, namely, an entirely new outfall. It so happens that I have means of doing this which very few persons possess, from having direct communication with the sea-wall; but it would be almost impossible for any one but myself. I do not know another individual within several miles of me who could do the same thing.

674. Have you seen any effect produced in the neighbourhood of the outfall upon the health of the labourers and inhabitants?—None whatever. I must say, also, that an impression has gone forth to the Committee that these are inhabited lands; they are by no means inhabited lands; they are, all of them, below the level of high tide; and of course the ancient inhabited lands were always on the higher level, or on what may be termed the ancient shores of the river.

675. Sir *J. Shelley.*] In your case, I understand that you have means which others have not, owing to your having a tract which is underneath the sea-wall. In other cases it happens, I dare say, constantly, that another proprietor comes in between the individual wishing to drain and the outfall. Do you think that any Act of Parliament, which gives the power of compulsorily going through land under those circumstances, the damage being assessed and the money paid, would, in an agricultural point of view, be very beneficial throughout the country?—I think an Act of Parliament might be framed, which, with justice to both parties, would be beneficial.

676. Do not you think that an Act of Parliament giving compulsory power, compensation being secured for injury done, would be beneficial, in a draining point of view, throughout the country?—Clearly, if it were framed on a just principle.

677. Mr. *Wilkinson.*] Are the Committee to understand you to say that there was no difficulty in borrowing money in your case?—None. We are all Commissioners of Sewers, and are under the same law; but different Commissions of Sewers read the law in different ways, and their practice is various.

678. Your district is not the same as Mr. Hayward's?—No.

679. I understood you to say that you had no difficulty in borrowing money?—We had no difficulty in borrowing money; I think my friend, Mr. Westwood, will be able to speak more to that point, because he has been longer an acting Commissioner than I have.

680. The Committee did not understand Mr. Hayward to say that the difficulty in their district had arisen from want of power to borrow money, but merely from the apathy or indifference of three-fourths of the landowners or occupiers, whose consent was necessary. I understand you to say that you have not had that difficulty; that the owners and occupiers have given their consent in the proportion of three-fourths?—I do not know whether I ought to express an opinion as to evidence which has been previously given. I gathered from it that there was no valid security; we have not found any difficulty in persuading our lenders that we had that security.

681. (To Mr. *Hayward.*) Have the Commissioners in your district ever attempted

tempted to borrow money upon that security? I stated that we had never attempted to borrow money, but my own opinion was that we should have found difficulty in so doing. *R. W. H. Daré, Esq.* 7 July 1854.

682. Would that difficulty arise from getting the consent of three-fourths of the owners and occupiers?—The difficulty of having conclusive data of having obtained the consent of three-fourths of the owners and occupiers. There is no proof under which the party could say, "I am satisfied that I have the consent of three-fourths."

683. (To Mr. *Dare.*) You have not in your district had any difficulty in obtaining the consent of three-fourths?—The consent of a great number has been obtained, which the lenders have assumed to be three-fourths, or if not, they have expressed themselves satisfied and lent the money; I have no doubt that Mr. Hayward's difficulty is the correct view of the case, and that a captious lender would reasonably object to it.

684. Colonel *Dunne.*] I understood you to say that, in your own instance, the confidence which is placed in the character of the gentlemen to whom the money is lent is the real security?—I believe that to be the real security.

685. The legal difficulty remains?—Yes.

686. Sir *J. Shelley.*] Perhaps you may be differently situated as regards owners to the marsh, of which the last witness spoke; you may not have so many?—We are differently situated on the marsh to which I allude; my mother, myself, and one other gentleman could just do the thing amongst us; that is one of the reasons I mentioned to you why I have been able greatly to improve my own marshes. I am in a position to form my own opinion as to the proper outfall, and to act on it, and I have applied to the Drainage Commissioners for the loan of 1,000 *l.* for that purpose; and I have a plan now being organised by Mr. Josiah Parkes for that purpose.

687. Have you obtained the money from one of the companies?—From the Government; I have had 5,000 *l.* for my mother and 5,000 *l.* for myself.

688. Mr. *J. MacGregor.*] Have you spent the 10,000 *l.* already?—No, I am going on very rapidly with it.

689. You have heard the sanitary evidence which has been given?—Yes.

690. Do you concur in the opinion, that it would be a great public benefit to drain these marshes?—Most decidedly it would. I concur in the evidence which has been given by Dr. Manley with regard to Barking, that the drainage has improved the health of the town; I can recollect, as a child, when quinine used to be mixed in buckets; but now Mr. Manley says, that in his practice he has not had six cases of ague within the last 12 months. I think in my own district of Rainham and Wennington there is comparatively little ague, much less than upon the Kentish side, and much less than there is in the neighbourhood of Grays and Orsett, and further down the river; this however I give only as hearsay evidence, but the district possesses a very indifferent reputation.

691. *Chairman.*] What you have spoken of is from your own observation as a country gentleman?—Yes; there is a constant tendency to ague amongst the poor who do not live in the marsh, but who live at distances of one, two, or three miles from it.

692. Has that tendency decreased according as the drainage has improved?—Yes; it has decreased very much as the drainage has improved.

693. Mr. *Wilkinson.*] Do you believe that the malarious influence extends to considerably beyond the marsh itself?—Clearly so, because the labourers who work upon the marsh are not the only persons who are affected; their wives and families who never set a foot upon the marsh are affected by it.

694. Do you apprehend that it could reach, in certain states of the wind, as far as the metropolis?—From certain districts it could; I do not apprehend that the marshes about the Nore would affect the metropolis; but the district adjacent to us here would affect the metropolis in the same way as the districts adjacent to Grays and Orsett affect them.

Mr. *Samuel Westwood,* called in; and Examined.

695. *Chairman.*] WHERE do you reside?—At Laindon Hill. *Mr. S. Westwood.*

696. Are you an agriculturist?—Yes.

697. To what extent?—From 600 to 700 acres.

 698. Is

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698. Is any of your land in the marsh?—Yes; I occupy about 100 acres in the marsh.

699. Are you one of the Commissioners of Sewers?—Yes.

700. Can you speak with regard to the state of the marshes, or any improvement which has been effected in them?—I can speak more particularly to the levels lower down than that of which Mr. Dare spoke.

701. What level do you refer to?—I should begin at West Thurrock, just below Purfleet, and from there down to Fobbing.

702. Can you describe to the Committee the state of those marshes which are under cultivation?—As nearly as I can judge, I think in the Level of Fobbing about one-fifth is in arable culture, and the remainder in grass.

703. Mr. *J. MacGregor.*] Can you speak to any other marshes?—In the Level of Mucking to Tilbury, I consider about a fourth is arable, and in another level, Chadwell to Grays, a fourth.

704. *Chairman.*] You are a Commissioner of all these levels?—Not of Fobbing; of the others I am.

705. How are these lands drained?—They are very indifferently drained.

706. Have you found any difficulty in improving the draining of the marshes?—There has not been any but very small works attempted in these levels.

707. You heard Mr. Hayward's evidence, that that has been in consequence of the owners and occupiers not being willing to come forward?—Yes; there is that difficulty; the parties having in many instances only a life interest in the property, have not the disposition to lay out money.

708. Sir *J. Shelley.*] Do you think any scheme which would throw the expenditure over a number of years would relieve or remove some of the difficulties?—I think it might.

709. *Chairman.*] Has any attempt been made to borrow money at all in your district?—There have been two or three instances; one which Mr. Dare spoke of, for making new sluices. In two or three instances, upon the level of which I am one of the Commissioners, there has been no difficulty in borrowing money in the way which Mr. Dare has explained.

710. What is the difficulty which you found on the other levels you have mentioned?—I do not think there has been any attempt made.

711. In fact, you agree generally with the evidence which has been given as to the difficulty which the Commissioners are under?—I do, most certainly. The law under which the Commissioners act appears to be so complicated and so expensive in the working, that there is a very great complaint amongst the owners generally.

712. You think that the Commissioners should have more power given to them?—Yes, and not be so much trammelled.

713. Sir *J. Shelley.*] I understood one of the witnesses to say that the Commissioners meet and have periodical surveys?—The Commissioners do not do so in the levels in which I reside.

714. How do you inspect the works?—By a marsh bailiff.

715. Who overlooks the marsh bailiff, to see that he does his duty?—No one except the Commissioners.

716. Practically, do the Commissioners, any of them, overlook the marsh bailiff?—Certainly not; those who are particularly interested, like Mr. Dare, I dare say keep their eye upon the marsh bailiff to see that he does his duty; there are not many resident Commissioners in the immediate neighbourhood in which I am interested.

717. *Chairman.*] You have no permanent surveyor?—There is a permanent marsh bailiff.

718. Is that the same officer as the marsh bailiff that you have mentioned?—Yes; he presents all the works that are required.

719. Sir *J. Shelley.*] Do not you think the Commissioners, depending entirely upon their bailiff, may give rise to the difficulty that there is in getting consent to the works being done?—No, I do not.

720. You think there is no want of confidence in the Commissioners on the part of those who have to pay the expense, with regard to any expenditure for the improvement of these marshes, in consequence of the Commissioners not looking after the works themselves?—Generally speaking, the owners of the property are Commissioners.

721. You say that the Commissioners trust entirely to the marsh bailiff, although they are landowners?—They do not interest themselves so much as they ought to do.

722. Mr. *Wilkinson.*] Would the majority of the Commissioners approve of an improvement of the drainage, or some works to be executed for that purpose?—I think they would.

723. Supposing the Commissioners thought that some great works should be effected in the drainage of these lands, and called a meeting of the owners and occupiers, and put it to them whether they desired to concur in the proposed works, what would be the result of such an application?—I think it is very doubtful; it would depend a great deal upon local circumstances, whether the parties had only a life interest in the property; in that case, they would not be likely to be ready to coincide with a large outlay.

724. Have you heard the evidence of Mr. Hayward, that the Commission, of which he is the clerk, called a meeting upon a certain occasion, and put it to the owners and occupiers, and there was a small concurrence?—Yes.

725. Have you ever attempted in your district to get a meeting of those parties who were interested for the purpose of improvement?—There never has been such a meeting.

726. *Chairman.*] The Commission has been almost a dead letter?—In many instances it has.

727. Mr. *Wilkinson.*] I suppose the Commissioners appoint the marsh bailiff?—Yes.

728. *Chairman.*] Do they pay him a salary?—Yes.

729. How much?—£. 150 a year in our district.

730. Colonel *Dunne.*] How many Commissioners are united with you for the drainage of these marshes?—We generally get a very slack attendance; only six, or eight, or ten.

731. You have no idea how many there are?—No; the clerk of the Commissioners, of course, can give you that information; there are many that pay no attention to it, and many of them never qualify at all.

732. In fact, they neglect their own interest if they are proprietors?—Yes.

733. Can you account for their indifference as to whether improvement of the drainage would not enhance the value of their land?—Many of the landowners do not live in the immediate neighbourhood; there are but a few resident in the immediate neighbourhood, and that partly accounts for the laxity.

734. There are people in the neighbourhood sufficiently qualified to act, or they would not be appointed Commissioners?—I think there are more appointed than are competent to qualify.

735. Can you suggest any practical improvement in the formation of the Commission?—I have thought whether or not the appointment of a paid Commissioner to take the district under his charge entirely, would be an improvement.

736. Would you prefer to have the district managed by Commissioners who are locally interested, or by a Board in London?—I think a Board in London would not do at all; for this reason, in cases of breach, where there is a great extent of water pressing upon heavy walling, I think it requires somebody upon the spot.

737. Mr. *J. MacGregor.*] Do you look upon the effect of the present state of the drainage of these marshes as a great public nuisance?—Yes; there is a great improvement wanted in the drainage in the lowering of the sluices and in opening other sewers. I quite agree with Mr. Hayward in what he has said about the private ditches.

738. Colonel *Dunne.*] Do you think that the Commissioners require increased powers?—Yes.

739. What powers would you increase?—I would increase the powers to enable the Commissioners to go on to the private lands to make a better drainage.

740. Or give them the power to compel private persons to do it?—Yes.

741. Mr. *Wilkinson.*] Supposing the constitution of the Commission was altered, do you think it would be possible to have the Commissioners elected by the owners and occupiers in your district, instead of their being appointed by the Lord Chancellor?—I do not think it would.

John Hayward, Esq., called in; and further Examined.

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742. Mr. *Wilkinson.*] THE Committee understand you to say that the Commissioners were appointed by the Lord Chancellor?—Yes.

743. And that the Act of Parliament directs that those Commissioners shall, before executing any works, obtain the consent of three-fourths of the owners and occupiers?—New works.

744. Works of all characters?—The smallest new works; even to an inch of new ditch.

745. You also said that the difficulty you experienced was, that when you summoned the owners and occupiers for the purpose of considering any effectual improvements, you have not been able to obtain the consent of three-fourths, or of any considerable number of those owners and occupiers?—Yes.

746. Do you think if those Commissioners, instead of being appointed by the Lord Chancellor, were to be elected by the owners and occupiers, leaving the action of the Commissioners perfectly free, without any further consent, that would remove the difficulty?—My opinion is, that practically it would not facilitate the work, because Commissioners would be elected, who would be elected not for the purpose of improvement, but perhaps for delay, in the present state of the feeling of the owners and occupiers.

747. Can you suggest any other mode by which the difficulty, which now exists to the improvement of these marshes, could be removed?—My own view is, that you should leave the Commissioners to execute works without the consent, in the first instance, of three-fourths of the owners and occupiers, leaving them to be dissentients if they thought fit, after certain notices had been given. My impression is, that your suggestion does not get rid of the difficulty, because, in point of principle, they would be still an irresponsible body.

748. You think, as I understand, if instead of being obliged to obtain the assent of three-fourths of the proprietors, you were at liberty to assume assent upon the non-expression of dissent, you would then get the difficulty removed?—That is my private opinion.

749. You do not approve of the principle of election, as applied to these Commissioners?—No, I think it would not work well.

750. Do not you think that the owners and occupiers of the marsh land, which would be so much more productive after being drained, would elect such Commissioners as they would have confidence in?—I can hardly imagine why they should oppose this improvement, it is so self-evident, and yet they do; there is a general dislike to laying money out.

751. Mr. *J. MacGregor.*] Has not the *vis inertiæ* of the two bodies been similar in that respect; the gentlemen who constitute the Commission have never solicited the assent of the owners and occupiers?—I quite admit that they have never actively interfered; whether right or wrong is another question. They thought, as a Court of Sewers, they were not the parties to take active steps in the matter; they are the parties to decide, for instance, between two antagonists. Supposing one body of persons is anxious for this drainage and another body is not, the Commissioners are the parties to decide between those contending parties. It occurs to them, to become partisans previously is not a fit position for a Court of Sewers to take.

752. You mean that there is no standard amount of drainage which the Commissioners feel bound to make compulsory?—They are a Court of Sewers, and have, no doubt, very extensive powers, and before them this question of drainage or non-drainage is to be contested.

753. *Chairman.*] They act as a jury?—They act as judge and jury, in point of fact. The parties go before them; one class says that there is a great benefit to be derived from this drainage; and another class says, we do not want it to be done; it is not the benefit which the other parties allege. It seems to me to be very obvious that the parties who are to judge between those two opinions ought not, by taking active steps, to become partisans one way or the other.

754. Mr. *J. Macgregor.*] There is no fixed minimum amount of drainage which ought to be effected; for instance, with regard to these private ditches, the Commissioners exercise no control over them, and the Act does not specify

that

that the parties shall keep them cleansed?—That is without their jurisdiction; they have no jurisdiction over them. The question of new works comes under the Act of Parliament, which gives them a discretionary power to do certain work, upon the consent of three-fourths of the owners and occupiers; that is brought before them, and it is an open question, which is to be discussed and decided by the Commissioners, sitting really and truly as a court, to decide between you and me; we may bring this question before them. You say, "I want this better drainage, and I want to interfere with your land, and I may resist it."

J. Hayward, Esq.

7 July 1854

755. We have been told by Mr. Russell that he has again and again complained to the Commissioners, and that they have taken no active steps to assist him?—We say, "We will do this work, if you will bring the consent of three-fourths."

756. Mr. *Wilkinson.*] The Commissioners feel that they ought not to canvass?—They feel that they ought to be acted upon, and not act. It is a question which has engaged their serious attention; and, after very great consideration, they have come to that conclusion, and in that they are borne out by counsel, whose opinions they have taken. You give arbitrary powers to Drainage Commissioners, under certain circumstances, and I do not see why these Commissioners should be entrusted with powers to execute works, subject, as I have said, to the dissent of three-fourths of the owners and occupiers.

Martis, 11° *die Julii*, 1854.

MEMBERS PRESENT.

Sir E. Filmer.	Mr. Thomas Greene.
Sir John Shelley.	Mr. James MacGregor.
Mr. Alderman Cubitt.	Mr. Masters Smith.
Mr. Wilkinson.	Colonel Dunne.
Mr. Vansittart.	

SIR EDMUND FILMER, BART., IN THE CHAIR.

John Ayrton Paris, Esq., M. D., called in; and Examined.

J. A. Paris, Esq., M.D.

11 July 1854.

757. *Chairman.*] YOU are President of the College of Physicians?—Yes.

758. I believe you have been in communication with some gentlemen with regard to the improved drainage of marsh lands eastward of London?—I have.

759. You say in your letter to the Rev. Mr. Acworth, "I have witnessed with great satisfaction your sanitary efforts to redeem Plumstead Marshes from their deleterious character, and I respond to your request to add my testimony to the necessity of such efforts, with the utmost satisfaction. It appears to me so self-evident that a marsh so contiguous to London must, under certain conditions of the atmosphere, spread its malign influence over the eastern part of the metropolis, as to require no evidence for its confirmation. I have, however, no hesitation in stating, that I know from experience that such is the case." Do you see any reason to change the opinion which you have expressed in that letter?—No, not at all.

760. Sir *J. Shelley.*] The object of this Committee is to ascertain whether these marsh lands being within reach of the metropolis, they have the effect of causing a great increase of various diseases upon the east part of London; do you coincide in that opinion?—I can imagine, under certain circumstances of wind and weather, that the miasm of the marsh may be transferred to the eastern part of London.

761. How far do you imagine it is possible that the effect of those marshes could extend into the eastern part of the metropolis?—That I cannot say; it is a speculation into which I cannot enter.

762. Do you find that there is more illness in that part of London which adjoins the marshes than in other parts?—That is a question which I cannot answer; it is a very difficult question.

J. A. Paris, Esq. M. D.

11 July 1854.

763. Mr. *Vansittart.*] You say in this letter, "I have no hesitation in stating that I know from experience that such is the case"?—I have known ague in the eastern part of London, which I believe was derived from the marshes of Essex. I speak generally as to facts.

764. In giving that opinion, do not you allude to more than one case?—I really do not know. I have had no time to consult my memoranda.

William W. Gull, Esq., M. D., called in; and Examined.

W. W. Gull, Esq., M. D.

765. *Chairman.*] I BELIEVE you were in communication with some gentlemen upon the subject of the Woolwich Marshes?—I was.

766. With regard to the health of the locality?—Yes.

767. Have you turned your attention at all to how the health of the metropolis may be affected by these marshes?—I have. I may first state, that from Woolwich along the line of the Thames, even up beyond Westminster, we are frequently receiving cases of distinct ague and other direct effects of miasm at Guy's Hospital, both into the house and as out patients.

768. Do those patients come from near Woolwich, or on the whole line up the river?—About half come from Woolwich and Erith.

769. And the other cases from nearer London?—The other cases occur in our own districts. We get them from the Isle of Dogs, Greenwich, and Deptford, and Rotherhithe; we get them also from Wapping, Shadwell, Bethnal Green, and Whitechapel; we get them along the Thames from Bermondsey and Lambeth, and even from the place upon which these Houses are standing; from Westminster we have marked cases of miasmatic influence.

770. Do you attribute those cases to the malaria from the marshes?—It would be difficult to say that; the marsh is one of the most fruitful sources of miasm. I have no doubt that London, on the banks of the Thames, is miasmatic.

771. Sir *J. Shelley.*] Do not you think the defective drainage of London may have some material influence?—There is no doubt, taking the whole of the population of London, that the draining has had very much to do with lessening the miasmatic condition of London of late years. We, however, even now see miasm not only producing ague, but having a distinct influence upon other diseases. The common fever of London in certain seasons assumes, to use our language, quite a miasmatic type. We find persons suffering under typhus and typhoid fevers suddenly losing the characteristics of the fever, and assuming quite an aguish character.

772. Has that increased of late?—No, we cannot say that it has increased of late; it is uncertain in its appearance; we have it in some seasons, and we lose it in others.

773. Mr. *Vansittart.*] Does that depend at all upon the wind?—I can mention but one striking case which may bear upon that point, because patients do not always apply to us at the time they are taken unwell. I have a case of quartan ague under my care, at Stoke Newington, the history of which is very striking and clear. The patient came out of a heated church, with the wind blowing from the south-east, which was just in the direction of the miasmatic district; although Stoke Newington is not a miasmatic place at all, the patient has become the subject of distinct quartan ague.

774. Do you find ague more prevalent, in your experience, when the wind is blowing from the quarter in which the marshes are situated, that is, the easterly winds?—I cannot answer that question, because cases do not generally come under our care at the time they are first stricken with the miasmatic influence.

775. I presume there may be some seasons in which those cases are more prevalent?—They are generally more prevalent in the spring and autumn, or towards the end of the autumn.

776. Mr. *Greene.*] Is not it the case in every part of the world at some seasons of the year, that there is more ague?—Yes.

777. *Chairman.*] Is your opinion that if these marshes were properly drained there would be less malaria along the banks of the Thames?—I cannot doubt it.

778. Mr. *M. Smith.*] I see in your letter, you say, "the draining of Plumstead Marshes would destroy a very fertile source of malaria;" you do not mean that it would totally remove the ague?—No. There is another view of the subject

subject which I should like to mention, because, perhaps, it bears more upon the question. How much malaria affects the health of London must, of course, be very much a theoretical question; but it is very remarkable that diseases which are not distinctly miasmatic, do become much more severe in a miasmatic district. Influenzas, which prevailed in England in 1847, were very much more fatal in London and the surrounding parts than they were in the country generally, and influenza and ague poisons are very nearly allied in their effects. The mortality of London was, for the last six weeks of the year 1847, increased 80 per cent. by influenza, and that per-centage was very much greater for London than it should have been for the number of its inhabitants, considering the general mortality of influenza.

779. Mr. *Greene.*] Are you prepared to show that it differed in any one part of London from another?—Yes; we have distinct evidence from Dr. Farr's accounts, that toward the east of London the per-centage was nearly three times greater than it was in the higher districts about London.

780. Sir *J. Shelley.*] Is the east part of London more crowded as to inhabitants, and the house accommodation inferior?—Yes, altogether.

781. Mr. *Greene.*] It might have arisen from such causes?—Yes, but it was very striking; in St. George's-in-the-East, which is a district coming under the miasmatic influence, the proportion of fatal cases was very great indeed, being raised during the epidemic from 29 per 1,000 to 73.

782. Mr. *Vansittart.*] Is not influenza a disease almost peculiar to, or at any rate always much more prevalent in large towns than in the country?—Yes; but London suffered much more in proportion, contrasting it with other towns in England.

783. As the proportion of London is to other towns, so is the proportion of other towns to the country, I presume?—It may be so.

784. *Chairman.*] Have you any other observation to make?—I can only give a few facts. We receive amongst the applicants at Guy's Hospital, in a year, nearly 200 cases of distinct miasmatic poisoning, of which, from March 1853 to March 1854, we admitted 52 cases of ague, half of which came from Woolwich and Erith, and the others occurred in London.

785. Mr. *M. Smith.*] Do you suppose that the large amount of mud on the sides of the Thames has an injurious effect upon health?—We think it has a very injurious effect: for a large portion of the 24 hours it is left exposed to the air, when it must be evaporating noxious gases

786. Mr. *Greene.*] Is there a greater proportion of cases of ague in Guy's Hospital than there is at St. Bartholomew's or St. George's?—I have spoken to my friend Dr. Jeaffreson, physician of St. Bartholomew's Hospital, and we find our experience different. I have called upon my friend Dr. Risdon Bennett, physician of St. Thomas's, and we find our experience correspond as to the frequency of aguish affections. The chaplain of Guy's Hospital, who resides in the hospital, has twice had ague. At St. Bartholomew's ague is not frequent.

787. Mr. *Vansittart.*] From your experience, do you attribute the prevalence of ague in the metropolis in any way to the miasma carried there from the marshes toward the east of London?—I cannot answer that question. Certainly I might answer it in some respect indirectly. Marsh miasms are conveyed, no doubt, a considerable distance; sufficiently authentic cases are recorded to show that the influence of marsh miasm extends several miles. Dr. John Macculloch, who wrote a very careful work upon the subject of miasm, gives several instances of its conveyance to that distance; but as the metropolis itself is miasmatic, it would be difficult to separate the effects of the two sources of influence. During this week I find in one of the journals a paper stating that many cases of ague have during this spring been admitted into St. George's Hospital, which the writer supposes may have come from Chelsea or Brompton. I am not able to give a more decided answer.

788. *Chairman.*] Still I apprehend, from your former evidence, that it would be beneficial to have these marshes drained thoroughly?—Yes; it must destroy a large fraction of the miasm.

W. Farr, Esq., M. D.

11 July 1854.

William Farr, Esq., M.D., called in; and Examined.

789. *Chairman.*] HAVE you considered the question of the effects of malaria from these marshes upon the health of the population?—I have examined the question extensively, and I find facts innumerable to show that marshes are injurious to health, and cause certain diseases.

790. Will you detail to the Committee the result of your investigation?—With regard to the influence of the Thames Marshes, I have looked over the pamphlet which has been produced, and the facts given by Mr. Bossey and others. It appears quite clear that those marshes produce ague in Woolwich; and the effects of malaria are distinctly felt as high up the river as Greenwich and Poplar.

791. Can you speak with regard to London?—I am at the head of the statistical department in the General Register Office, where the mortality of every district in the country is investigated, and I have prepared a table, with the sanction of the registrar-general, showing the mortality on both sides of the river, from which you will immediately see that the mortality in the districts adjoining the river is very much higher than it is in other parts of the country. The average mortality is about 20 in 1,000. There are districts in which not more than 14 in 1,000 die. At Dorking and Guildford, amongst the Surrey hills, the mortality is about 16 in 1,000. I begin at Poplar, on the north side of the Thames: the mortality in 10 years, from 1841 to 1850, was at the rate of 24 in 1,000; going down the river, at West Ham, 18; at Romford, 20: at Orsett, which you observe is very marshy, the mortality is 24 in 1,000; it is very high: at Billericay, 20; and Rochford, 21. These are unions or districts including a great many parishes. We cross over to the south side, and begin at Greenwich: Greenwich differs little from Poplar; the mortality, including the deaths in the hospital, is rather high, 28 in 1,000; that includes Woolwich: Lewisham is 17; Dartford, which takes in Plumstead Marshes, 19; Gravesend, 25; North Aylesford, 22; Hoo, 24; Medway, 25; and Milton, 21. The greater part of the country on the north side of the Thames is thinly inhabited; therefore you have not one cause of mortality which is found in towns. The population is spread over the high land, and, but for the marshes, the mortality would be much lower. It is not at all over-crowded, and that element of mortality is absent. There are other parts of the country, such as Wisbeach and the Isle of Ely, and along our east coast, where the mortality is as high as it is in the most malarious of these districts. There have been extensive researches in France, where the mortality is much higher than it is in the marsh lands of England. No doubt the mortality along the Thames would be higher than it is if it were not partially drained, and if it were not for the fact that the population is not really dwelling on the marsh, but on the higher grounds upon the borders of the marsh. With the permission of the Committee, I will hand in the table which I have prepared (*the same was delivered in—vide Table annexed*).

792. Is it not your opinion that if these marshes were thoroughly drained, the mortality would be much lower in this district?—Clearly; the population adjoining the marshes would be much healthier.

793. Do you think it would have any effect upon the health of London generally?—I think it would, to a certain extent. The margin of the river all the way down is nearly of the same marshy character as the place these Houses of Parliament stand upon; from Fulham down the river on either side it is a marsh.

794. You heard Dr. Gull's evidence; do you agree with him?—Yes; I do entirely. The facts which he has mentioned appear to me to show the aguish effect produced by these marshes.

795. Sir *J. Shelley.*] Putting aside the question of any ague produced by living on the banks of the Thames, can you give any evidence of the real effect of the want of drainage of the Plumstead Marshes, upon the metropolis?—As far as Woolwich is concerned, I think all the statements of Mr. Bossey, and the statements of Dr. Gull, and others, show clearly that these marshes affect Woolwich. We have a few cases of ague in the metropolis; we know that the mortality of the metropolis is very much higher than it should be, and very much higher than it is in the healthy parts of the country. A part of that mortality, I conceive, is owing to its bad drainage, and the bad drainage of the marshes which surround London.

796. Mr. *M. Smith.*] With respect to Billericay, I believe that is removed at a considerable distance on the high ground from the River Thames?—Yes.

797. Do

TABLE

SHOWING THE ANNUAL DEATHS TO EVERY 1000

LIVING ON BOTH SIDES OF THE THAMES.

	POPLAR.	WEST HAM.	ROMFORD.	ORSETT.	BILLERICAY.	ROCHFORD.
1841_50	24	18	20	24	20	21
1851_3	26	21	19	20	17	21
	Isle of Dogs.	*Abbey Marsh, and Plaistow & Eastham Levels.*	*Barking Level; Dagenham; Hornchurch; Rainham & Wennington Marshes.*	*Aveley; West Thurrock; E. and W. Tilbury, Muckinge; Salt; Corringham and Fobbing Marshes.*	*Yange; Pilsey and Bower's Marshes.*	*Canvey Island; Salt; Casey and Lee Marshes.*

R I V E R *T H A M E S .*

	GREENWICH.	LEWISHAM.	DARTFORD.	GRAVESEND.	NTH AYLESFORD.	HOO.	MEDWAY.	MILTON.
1851_3	25	18	18	22	20	23	23	20
1841_50	28	17	19	25	22	24	25	21
	Bugsbys Marshes.	*Plumstead Marshes.*	*Erith; Crayford and Dartford Marshes.*		*Gravesend; Higham; Cliff and part of Cowling Marshes*	*Part of Cowling & the whole of Hoo & St Mary's Marshes.*	*Borntwick; Sley; Greenboro; Chitney, and Barksoe Marshes.*	

NOTE.—*The Red figures show the Annual Mortality for 1841_1850; and the Black that of 1851_1853.*

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Henry Hansard, Printer

797. Do you know the extent of the rise from the river?—No, I do not; but the mortality is not very high in Billericay; it is 20 in the 1,000.

798. I think you have stated that the miasma reached as far as Billericay?—I have taken all the districts adjoining the river.

799. Do you suppose that that district is affected by the miasma?—I conceive it might be; the extent of the marshes and the elevation of Billericay would more or less influence the result.

800. When you allude to Cowling and Cliffe, and those places, and then state that the miasma reaches to the suburbs of the metropolis, you do not mean to say that the marshes so far down the river could have any influence on the metropolis?—I imagine that malaria can scarcely come up from Hoo to London; however, there are cases which show clearly that marsh malaria travels a considerable distance. Rochfort, in France, is affected by a marsh at a distance of seven or eight kilometers, or about six miles.

801. Do you suppose that the influence of malaria would extend to six miles?—I imagine it would have an appreciable effect upon the low ground when the wind was in that direction.

802. So as to affect the mortality of the district?—It might affect the diseases, but not the mortality very sensibly; ague, rheumatism, and those diseases have not a very great effect upon mortality.

803. You do not consider ague, generally, to be a disease of a fatal character?—Not the mild form of ague.

804. Supposing a disease takes the form of ague, would you consider it a favourable or an unfavourable symptom as regards the duration of life?—If the symptoms of fever intermit as they do in ague, of course it is favourable. In Italy, and other places, where marshes exist to a great extent, where the temperature is high, fever assumes various forms, according to the degree of the temperature.

805. Taking the mean temperature of this country and its dampness, do you consider generally that an acute form of disease terminates favourably by taking the form of ague, and not going on in its acute character?—I am not aware that it is common for other diseases to assume that remittent character.

806. *Chairman.*] Is it not frequently the case that remittent fevers become permanent?—They become remittent or continued fever.

807. May not that fever take any form?—It may take the remittent or continued form, which is a more fatal and pernicious form.

808. It does not necessarily follow, because it is an aguish fever, that the patient is not likely to die?—No.

809. Sir *J. Shelley.*] Do you consider that the marshes of Plumstead and Erith, with reference to which you are particularly giving evidence, have any effect upon the health of Hampstead?—I should not imagine that they had any appreciable effect.

810. Have they any effect upon the health of Marylebone or Pancras?—Any effect would be quite inappreciable.

811. Putting away from your calculation those who are living upon the banks of the Thames, do you consider that the marshes of Plumstead, and those in the neighbourhood of Greenwich, have any appreciable effect upon the city of Westminster?—I have no data for determining that question.

812. Do you believe that those marshes can have any real appreciable effect upon the metropolis?—I imagine if the banks of the Thames remain undrained, and the marshes all the way down the river, that when the wind sweeps the marsh air over London, it may affect nearly the whole of the inhabitants in all parts of London. Its influence might ascend to the higher districts, but not so as to become appreciable by any of our tests.

813. Belgravia was originally a marsh, in the memory of people now alive; do you consider that the drainage of Belgravia has tended to improve the health of those who are living on the banks of the Thames?—I think so; every part of London is benefited by an improvement of any other part: the benefit may not always be direct or appreciable.

814. Mr. *Greene.*] What distance is Lewisham from the marsh?—I am speaking of the Lewisham union or district, which extends down to Charlton; I do not recollect the distance.

815. Do you conceive that Lewisham is a district which might be affected by the marsh?—Part of it, such as Charlton. Unquestionably Lewisham, or some parts of the union, lie high, and may be beyond the reach of the marsh malaria.

W. Farr, Esq., M.D.

11 July 1854.

816. Even though parts of that district may be affected by the marshes, if I understand you rightly, you say that that district is particularly healthy, because the ordinary rate of mortality is 20 in 1,000; Lewisham is only 17. Notwithstanding the marshes, you find that to be a particularly healthy district?—Yes.

817. Is it further from the marsh than any part of London?—No, I should think it is nearer than many parts of London.

818. Mr. *Wilkinson.*] Is not the health of a district dependent upon the quality of the soil?—Yes, and upon the elevation of the soil, as well as the density of the inhabitants.

819. Is not the situation of Lewisham low?—I am speaking of the union; including Sydenham, Eltham, Blackheath, and all that part of the country.

820. Mr. *M. Smith.*] With respect to Milton, I think you stated that there was a high rate of mortality there?—No, it is a little above the average rate, 21 per 1,000.

821. You are aware that many inhabitants of the metropolis reside at Milton for a few months, and come away again; do you in any way suppose that that is in any way connected with the mortality of the district?—I should say that that was a reason for considering that the metropolis is interested in this question; numbers of the inhabitants of the metropolis go down the river for the sake of health; you might consider them interested in that way.

822. *Chairman.*] They go down to Erith?—Yes, and to Gravesend, Margate, Ramsgate, and places all the way down the river.

823. Do you consider the drainage of this district a matter of public importance?—Yes. I think all questions of drainage, as they affect the national life and health, are matters of national interest. An important effect of marshes is shown in France; in certain districts the population is very much deteriorated in strength and vigour. They find, on recruiting in the marshy districts, that the people living on the marsh are not healthy young men, and that half of them are unable to serve. In France where that question has been studied, marshes are more numerous and extensive than they are in this country.

824. Sir *J. Shelley.*] Supposing it were practicable to have a perfect system of drainage in London, and a perfect drainage of these marshes, which do you think will have the most instant effect upon the health of the metropolis?—The drainage of London itself. I may mention, in order to show how much property is deteriorated in the marshes, that a friend of mine was offered the living of Fobbing, which he says is worth about 800*l.* a year. He had lived before in a marsh district, where his family had suffered very much. He consulted me upon the subject, and he went down to Fobbing. He refused the living; and as he was a curate at the time, he would of course have naturally accepted the gift of the living if he had not thought his family would suffer from the marshes. He found that none of the farmers lived in the parish, and that it was so unhealthy that it would be dangerous to take his family down there. He also informs me that the gentleman who did accept the living has since been obliged to leave in consequence of the unhealthiness of the district.

825. Sir *J. Shelley.*] Do you know in whose gift that living is?—I think it is in the gift of the Crown.

826. Mr. *M. Smith.*] Is not Fobbing just on the confluence of several marsh streams and inlets of the sea, close to Canvey Island?—Yes.

827. Is not it notorious that nothing but wild ducks can live there?—That has not come within my knowledge.

828. Do you suppose that the best system of drainage, in whatever manner conducted, would have the effect of making it a healthy district?—I think parts of Holland must originally have been in a worse condition than Canvey Island, or Fobbing.

829. Do you suppose that any system of drainage, with the confluence of those streams, surrounded by mud, would have the effect of making that district so healthy that people could live there?—I think no system of drainage would make it as healthy as some districts of the country with which we are acquainted, but certainly it would make it in such a state that clergymen and landed proprietors might live in the parish. I have prepared a table which shows that the population of the marsh districts increases very slowly.

[*The same was delivered in, and is as follows*:]

TABLE of the Population, Births, and Deaths, in the Districts on both Sides of the Thames.

DISTRICTS.	MARSHES, &c.	Population, 1841.	Population, 1851.	Increase of Population in the 10 Years.	Births in the 10 Years, 1841–1850.	Births, 1851.	Births, 1852.	Births, 1853.	Deaths in the 10 Years, 1841–1850.	Deaths, 1851.	Deaths, 1852.	Deaths, 1853.	Annual Mortality per Cent., 1841–1850.
Districts on the South Side of the Thames, Eastward of London:													
Greenwich	Bugsbys	80,997	99,365	18,368	26,622	3,098	3,101	3,229	24,885	2,403	2,344	2,769	2·8
Lewisham	Plumstead	23,014	34,835	11,821	7,408	1,083	1,171	1,220	4,779	573	631	702	1·7
Dartford	Erith, Crayford, and Dartford.	25,366	27,330	1,964	8,134	924	926	845	4,883	475	450	547	1·9
Gravesend		15,670	16,633	963	4,902	574	601	552	3,965	381	386	343	2·5
North Aylesford	Gravesend, Higham Cliff, and part of Cowling.	14,676	16,569	1,893	5,284	610	576	608	3,388	321	354	324	2·2
Hoo	Part of Cowling, and the whole of St. Mary and Hoo.	2,794	2,845	51	1,118	107	125	104	686	59	73	65	2·4
Medway		37,616	42,796	5,180	12,594	1,442	1,474	1,440	10,239	1,154	863	967	2·5
Milton	Borntwick, Sley, Greenboro, Chitney, and Barksoe.	11,492	12,026	534	3,298	471	421	471	2,514	207	254	259	2·1
North of the Thames:													
Poplar	Isle of Dogs	31,122	47,162	16,040	13,953	1,824	2,023	2,166	9,448	1,121	1,176	1,353	2·4
West Ham	Abbey Marsh, and Plaistow and Eastham Levels.	26,920	34,395	7,475	8,338	1,103	1,190	1,248	5,658	632	717	800	1·8
Romford	Barking Level, Dagenham, Hornchurch, Rainham, and Wennington Marshes.	22,206	24,607	2,401	7,970	834	819	886	4,796	411	473	524	2·0
Orsett	Aveley, West Thurrock, East and West Tilbury, Muckinge, Salt, Corringham, and Fobbing.	10,156	10,642	486	3,703	403	400	350	2,486	221	209	202	2·4
Billericay	Vange, Pitsey, and Bowers	13,607	13,787	180	3,952	446	412	406	2,772	212	243	250	2·0
Rochford	Canvey Island, Salt, Casey, and Lee.	15,920	15,838	Decrease, 82	5,181	512	512	503	3,315	341	330	304	2·1

Thomas Webster Rammell, Esq., called in; and Examined.

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830. *Chairman.*] YOU are a Civil Engineer, I believe, of some experience?—I am.

831. Has your attention been lately called to the state of the marshes on both sides of the River Thames?—I have been directed by the Board of Health to examine those marshes.

832. Will you give the Committee the result of your examination, with regard to their present condition, in the first place?—I have examined the marsh lands generally on both sides of the river. The gross extent of marsh land between London and Sheerness I make, on the north side, to be about 22,000 acres; and on the south side rather more than 16,000 acres; being a total of nearly 39,000 acres.

833. Mr. *Greene.*] Will you describe the points at which you began and at which you terminated, on each side of the river?—I was about to observe, that the marshes are divided into separate areas by the high lands which come down to the river. Commencing on the north side, the first area of marsh land is the Isle of Dogs, which contains about 400 acres. There is then a very extensive area extending from Blackwall down to Purfleet, where the high land touches the river: that I have calculated in three separate areas, of 2,900 acres, 2,400, and 2,000; making altogether about 7,000 acres in that level.

834. What do you mean by those divisions; are they under separate commissions?—Yes. There is, then, on the north side, an area between Purfleet and Grays containing nearly 1,000 acres. Then there is, between Grays and Tilbury, an area of about 3,000 acres; I should observe, that these areas have been roughly measured from the Ordnance map.

835. Are each of those areas you have specified under separate commissions?—Not all under separate commissions.

836. Will you explain which are under separate commissions?—The first area, the Isle of Dogs, is under the Metropolitan Sewers Commission.

837. Sir *J. Shelley.*] Is there any other under that commission?—They have also an area of marsh land on the south side of the river eastward of Greenwich; I had some difficulty in ascertaining the limits of those commissions; I will give the areas as nearly as I can. I will begin with the Metropolitan Commissioners. Under the Metropolitan Commission are the Isle of Dogs and part of Greenwich Marsh, making together about 580 acres. There is then a commission extending over Dagenham, on the north side of the river; that appears to extend from Blackwall down to Rainham (the part coloured yellow upon the small map), and contains about 5,500 acres. Then there is a commission, coloured blue upon the small map, with about 6,500 acres, on the north side.

838. Mr. *Greene.*] What places is that between?—It is between Rainham and a point beyond East Tilbury, just opposite Hope Point. There is then a portion on the north side, near Fobbing; that I am told is under a separate commission; that contains about 3,300 acres; it is coloured green upon the small map. Then there is Canvey Island, which appears to be under a separate commission.

839. Sir *J. Shelley.*] Is not that some distance from London?—It is a long way below London, undoubtedly; Canvey Island contains about 4,000 acres. Then there appear to be about 3,000 acres of land out of commission on the north side. On the south side, from the Isle of Grain up to Gravesend, there are about 11,000 acres in commission.

840. Mr. *M. Smith.*] Upon what data do you give that?—It is a measurement from the map; those are the marsh lands extending from Gravesend to the Isle of Grain.

841. Mr. *J. MacGregor.*] You mean that there are 11,000 acres of marsh land, whether in commission or not?—Yes; I am not acquainted with the limits of the commission; I believe their district extends up the River Medway some considerable distance.

842. Mr. *M. Smith.*] The Committee understand that there is a very extensive tract of marsh land which is in commission, a portion of which is drained, and a portion of which does not require draining at all. The commission extends to Penshurst?—I mean that the extent of marsh land below Gravesend, down to Sheerness, is about 11,000 acres.

843. Mr.

843. Mr. *J. MacGregor.*] That is irrespective of the question of commission?—Yes.

844. *Chairman.*] Of marsh land, drained and undrained?—Drained or undrained. I simply speak of the extent of marsh land. There is a small area at Northfleet, containing about 300 acres, that is under commission, extending from Northfleet to Greenhithe.

845. Mr. *MacGregor.*] You are not specially informed as to what land is under commission or not?—No.

846. *Chairman.*] Will you state particularly, with regard to the Erith and Plumstead levels, what engineering works are required to carry out a more efficient system of drainage?—That area, I take to be 3,000 acres of land, about half of which is under arable cultivation, the other half being meadow and pasture.

847. Mr. *Greene.*] Is the level you are now going to refer to under any commission of sewers?—It is under a commission, extending from Lombard's Wall to Northfleet; the whole of that area is below the high-water level of neap tides; Lombard's Wall is the boundary between the district of the Metropolitan Sewers Commission and the commission of which I am speaking. The lowest parts of that area are about seven feet six above the low water of neap tides; some parts of the level rise as much as 10 feet above the low water of neap tides.

848. How high does the tide rise in those parts, taking an ordinary neap tide?—The neap tide which I observed on the 4th July rose 14 feet.

849. What is the height of a spring tide?—An ordinary spring tide will rise 18 ft. 6 in. The Plumstead and Erith level to which I am referring is subdivided into fields by ditches, which serve the double purpose of fences and of reservoirs for supplying water to the cattle. I make the total length of ditch upon the area 84 ½ miles, which, at an average width of six feet for each ditch, will give about 60 acres of land.

850. Sir *J. Shelley.*] Can you state how many separate owners of land there are in that area?—I have not been able to ascertain. I presume there are a great many. I have been told that the marsh is in tolerably large ownerships; in some cases there are plots of 200 acres belonging to one proprietor.

851. Mr. *Greene.*] Is the whole of the district of which you are now speaking under one commission of sewers?—Yes.

852. *Chairman.*] What did you find to be the case with regard to this level?—I found the level of the water in the ditches to be generally such as not to admit of subsoil drainage.

853. Sir *J. Shelley.*] It is above that?—Yes.

854. When you speak of subsoil drainage, what depth do you mean by subsoil drainage?—I should take three feet six inches to four feet as the depth of subsoil drainage. The area is at present drained by five sluices, which are at levels respectively of three feet six inches, three feet, three feet six inches, and two feet above the level of neap tides. Now it appears to me that the best mode of improving this district would be to get rid, as far as possible, of the stagnant water in the ditches.

855. Mr. *Greene.*] The five sluices you have named, I presume, close by gates at the rising of the tide?—They close at the rising of the tide; they are self-acting.

856. Are they by gates or by flaps?—Ordinary wooden flaps; one is of cast iron.

857. Sir *J. Shelley.*] The effect of getting rid of this stagnant water in the ditches would, of course, be to lay these ditches dry, supposing you succeeded. In what way would you propose to subdivide the land (as a part is under cultivation) so as to prevent the stock from the grass land getting into the arable land?—That is one of the principal points I have had to consider. I think the better way would be to use the ditch partly as a fence, and to plant quick on one side, with a line of posts and rails to protect it.

858. I understood you to say that there were 84 ½ miles of ditches; have you made any calculation as to the quantity of fencing that would be required?—I have. I should tell you that the abolition of the ditches involves the question of water supply to the cattle, as well as of fencing. It appears to me that 20 miles of the ditches might be abolished altogether; the remaining 64 ½ miles might be laid dry, and a hedge fence added to them, as I have described.

859. Would you fill up the abolished ditches?—I would fill them up partially,

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and slope the ground on either side; and I make out that we should have a clear gain in the value of the land obtained.

860. After the works are completed?—Yes.

861. *Chairman.*] That must be in land that lies together, belonging to one and the same individual?—Undoubtedly, excepting where it is arable land; one half of the whole area consists of arable fields.

862. There it would not be required?—No.

863. Sir *J. Shelley.*] Do you consider that no fence would be required between arable fields belonging to different proprietors?—I think not.

864. In the case of land on one side being under seed, and the other under turnips, you propose that the sheep should be confined by hurdles?—The sheep, in that case, would be always folded. There are large areas in this country where there are no fences whatever. If you take the Isle of Thanet, there is hardly a fence upon it.

865. I presume the land in the Isle of Thanet is held in larger ownerships than in these marshes?—Probably it is. Perhaps I had better describe the works I propose for the drainage of these marshes: I divide them, first, into main works of drainage; secondly, into works of water supply for the cattle; thirdly, into works of fencing; and fourthly, works of subsoil drainage. The main works which I should propose would cost about 8,000 *l.*; they would consist of a main cut through the centre of the level, as shown upon the Plan, with other cuts leading to five outfall sluices, those sluices being placed at a level of two feet above low water of neap tides.

866. Suppose in constructing a main cut, that in cutting through a field you leave a small corner belonging to that field severed, which must be therefore joined to another field, have you any idea how that is to be remedied, because you may have a bit of land which may be of no use to anybody?—The works would be laid out in give-and-take lines; in some cases there might be a positive interchange of land.

867. It would be necessary to have some power of changing?—Undoubtedly.

868. Mr. *Wilkinson.*] What will be the width of these cuts?—I propose to make them five yards wide; and then, for ensuring a change of water in the main cut in dry weather, I propose to fix three inlet sluices, the cost of which is included in the estimate of 8,000 *l.* It appears to me that the water supply for the cattle would be best obtained by storage reservoirs at the foot of the high lands adjoining the marshes, and conveyed to the separate fields in iron pipes; the cost of these works I estimate at 3,900 *l.*; the cost of the fencing I put down at 8,400 *l.*

869. Sir *J. Shelley.*] Do you propose to have quick fencing?—I propose to have quick planted on one side of the ditch.

870. And protected for the time by a three-railed post and rail fence?—Yes.

871. I suppose you have estimated that at the rate at which fences on the side of railways have been done?—Yes. The subsoil draining of 3,000 acres I have taken at 16,500 *l.*

872. How much is that an acre?—£. 5. 10 *s.*

873. Do you propose to do it four feet deep?—From three feet six inches to four feet.

874. Do you consider that a two-inch pipe would be sufficient?—Yes, and I would lay the lines about eight yards apart.

875. At how much a rod do you calculate that?—I have taken 1 *d.* a yard for the laying, and 1 *d.* a yard for the pipe; the whole of the works I have described would involve a total outlay of 36,800 *l.* on those 3,000 acres of land.

876. Mr. *Wilkinson.*] How much an acre does it come to?—It comes to 12 *l.* 4 *s.* 10 *d.* per acre. The outlay per acre on the main works will be 2 *l.* 13 *s.* 2 *d.*; on those for the supply of water, 1 *l.* 5 *s.* 8 *d.*; the fences will cost 2 *l.* 16 *s.*, and subsoil drainage 5 *l.* 10 *s.* It seemed to me that it might be as well to calculate the annual payment which the carrying out these works would involve. Supposing the money to be borrowed at four per cent, and to be paid off by equal annual instalments of principal and interest in 30 years, it would require 3 *s.* 1 *d.* per acre per annum for the main works; for the water supply 1 *s.* 7 *d.*; for the fences 3 *s.* 4 *d.*, for the subsoil drainage 6 *s.* 5 *d.*; making a total charge of 14 *s.* 5 *d.* per acre per annum.

877. Sir *J. Shelley.*] Redeeming the principal and paying the interest in 30 years?—Yes.

878. In

878. In what way do you propose that the annual expense of keeping up this fencing, clearing the quick, and so on, should be defrayed?—I should imagine that would not exceed the present annual expenses of keeping up the fences properly; the one would balance the other.

879. Have you made any calculation with respect to the present expenditure of keeping up those ditches?—I have not; I did not receive instructions to inquire into this matter more than 10 days ago; therefore I am not prepared to give evidence on minor points.

880. Do you calculate in the 3*s.* 4*d.* the annual expense of keeping up the fences?—No, I do not.

881. The 3*s.* 4*d.* is the cost of first putting down the fence?—It represents the annual instalment per acre for that item, spread over 30 years. I suppose the post and rails would last about 10 years, and by that time the quick will be sufficiently strong to serve as a fence.

882. Mr. *Wilkinson.*] Is that the whole of your proposition?—As far as regards the improvement of that level.

883. Your plan does not include the alteration of the ditches and deepening them, so as to make them useful as drains?—I propose emptying the ditches of water.

884. Have you thought of the plan of deepening those ditches, and retaining them as fences?—I have thought of that; but it appears to me that no material improvement in the health of the district would take place, unless you get rid of the water; the mere lowering of the ditches would not improve the health of the district.

885. *Chairman.*] If those ditches were made deeper instead of being dammed back, even then you think it would not improve the health of the district?—I do not know how you are to get a circulation of water through the ditches; and unless you get a change of water, I do not see how you are to have an improvement.

886. Mr. *M. Smith.*] Do you think the mud on the shores of the river outside the wall causes a great deal of malaria and fever?—I should imagine not.

887. You think the diseases which are incident to low situations are not affected by the mud which is on the outside of the wall?—I should imagine not; I think the malaria is chiefly due to the stagnant water in the marshes; either water held up in the soil itself, or contained in the ditches.

888. Sir *J. Shelley.*] In the item of pipes for the drainage, do you propose to use earthen pipes, or do you contemplate using iron outlet pipes?—The outlet sluices will be of cast iron, the drain pipes will be of earthenware.

889. In calculating the cost of the drainage, did you take into consideration the outlet pipes being iron?—Yes.

890. For the subsoil drainage you propose merely two-inch pipes?—Yes.

891. Have you inquired into the average rental of land in that district?—Not particularly. I am told that it is about 35*s.* an acre.

892. What is your calculation of the improved value of the land after these works are completed?—I have made no calculation upon that subject; it is rather an agricultural question than an engineering one.

893. You cannot say whether the 14*s.* 5*d.* per acre which this drainage will cost to the occupier will be repaid by the increased improvement?—I cannot speak to the value of that improvement myself.

894. Mr. *Vansittart.*] Do you consider that these ditches if kept dry would act as fences or not?—Not without a quick.

895. Would it not be necessary if these ditches were deepened to any extent to have them walled up with stone, or something of that kind?—I think not; the deepening would not be more than nine inches or one foot. Most of them are now some four or five deep.

896. Mr. *J. MacGregor.*] Is the proposed system of drainage, for which you have given an estimate, the only one which suggests itself to your mind as the means of improving these marshes?—Thoroughly to remove the present stagnant water of these marshes, I think it is.

897. You do not think the sanitary condition of the marsh could be satisfactorily changed without this outlay?—I think no material improvement would take place unless you remove the present stagnant water. I conceive the works are not larger than would be necessary for that purpose.

898. Would not the opening of the private ditches keep the water flowing?—

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No, by so doing you simply lower the level of the stagnant water; you do not remove it.

899. Are there not numerous land springs which pass through those ditches?—For many months of the year there is no water going down those ditches.

900. *Chairman.*] It is your opinion that the drainage of these marshes could not be done for less money than you have named?—Perhaps the subsoil drainage might not be considered a necessary work, but with that exception I consider the works are necessary works; the subsoil drainage is very nearly half the amount.

901. Mr. *Wilkinson.*] In point of fact you directed your attention rather to the most efficient mode of doing these works, than as to whether it would be expedient to execute them?—Yes.

902. Sir *J. Shelley.*] Do you believe that the sluices and the main cuts which you propose would have the effect of laying the land, what the farmers call dry, without the subsoil drainage?—They would give complete control over the water falling or coming down upon the marsh, and they would enable you to change that water as well; I assume that, to improve the district, you must remove the stagnant water in the ditches.

903. I understand you are employed under the Board of Health?—I am one of the superintending inspectors of the Board of Health.

904. Has this plan of drainage been suggested to the Board of Health at all?—Not at all.

905. It is your opinion as an engineer as to what should be done?—Yes; I have had no communication with the Board of Health on this subject; the Board was requested by the Home Office to send down an inspector, and they appointed me for the purpose.

906. Has your plan in any way been before them, since you were sent down?—In no way whatever; I have not communicated with them on the subject.

907. Mr. *Wilkinson.*] Have you made any report to the Home Office?—I have not, I have been simply preparing evidence for this Committee.

908. Sir *J. Shelley.*] Did the Home Office, or the Board of Health, send you down to prepare evidence for this Committee?—The Board of Health, at the request of the Home Office, sent me down. My evidence is confined to engineering points; I am not prepared to speak on other points.

909. The Committee are to take your statement as your individual opinion as an engineer?—Yes.

910. You think, after looking the whole subject over, without going into the question of expense, as to whether it will pay or not, that this is the only way or the best way to carry out the objects of the thorough drainage of that land?—It appears to me it is the only way of securing the one great object of removing the stagnant water.

911. Mr. *M. Smith.*] You do not think it could be done for a less amount?—I believe these amounts are closely calculated, and I have no doubt the works could be executed for the amount which I have stated.

912. *Chairman.*] Are you at all aware of the value of this marsh land?—I should take the land to be worth about 60 *l.* an acre; these works would cost about a fifth part of their value.

913. Sir *J. Shelley.*] With regard to the subdivision of these fields, your idea would be to throw these fields together, and have the power, under some arrangement for this drainage, for an exchange of land of the different owners?—It would. The proposed division, taking into account the abolished ditches, would lay the land into about 20-acre fields over the whole area.

914. What is the fall of the main cut, as regards the highest part of the marsh?—I propose five main sluices; I propose to fix those at a level of about two feet.

915. Does it run both ways?—It will be a perfect level across the marshes.

916. There must be a fall at each end, or at one end?—Practically it will be level.

917. Therefore, practically, it will be full of water always?—It would contain about one foot of water at the lowest.

918. And that would be stagnant water, would it not?—It would be water which you might change with the inlet sluices.

919. Will the water be used for drinking purposes?—No; it will be water admitted from the river.

920. Mr. *Wilkinson.*] You could let the water through those sluices, if you chose?—

chose?—In dry seasons I should take in water; in the winter I should not want water, because there would be sufficient hill water coming down.

921. Sir *J. Shelley.*] Your object would be to prevent the water becoming stagnant?—Yes.

922. Mr. Alderman *Cubitt.*] Do not you deem it necessary to get rid of the stagnant water on sanitary grounds?—I do; that is the only improvement of which in my view the district is susceptible.

923. Sir *J. Shelley.*] Do you mean the stagnant water on the land, or in the ditches?—Partly in the soil itself, which you would get rid of by subsoil draining; but chiefly in the ditches.

924. Without subsoil drainage, do you consider that the mere fact of getting rid of the stagnant water in the ditches would thoroughly drain the land?—I do not.

925. Would it have any practical effect upon the stagnant water in the land?—Certainly not.

926. Mr. *M. Smith.*] Would not the necessary consequence of draining the ditches be, that there would be no water for the stock?—Yes.

927. I think I understood you to state that the water would be supplied to the stock by reservoirs?—Yes.

928. How do you propose to fill them?—There would be two ways of obtaining a supply; one plan is, to have a system of ponds throughout the level.

929. Where do you propose to get the water from for the ponds?—From the subsoil drains. The ponds must be of a sufficient capacity to hold a proper supply for the cattle.

930. Are there any springs in the district?—None of any size.

931. Then you must depend upon some adventitious source of supply?—I should propose to construct these reservoirs, and make them each capable of holding half a million of gallons; I would lay a system of pipes from the reservoirs, and the whole of these works of water supply would cost about 4,000 *l.*

932. Colonel *Dunne.*] What would be the improvement?—The cost of the improvement would be about 12 *l.* 4 *s.* 10 *d.*

933. Sir *J. Shelley.*] Have you in this estimate of 3,500 *l.* calculated the actual cost of supplying the water, laying it on and turning it off?—I take it that would be nothing; the tanks would be supplied by self-acting ballcocks. I assume that the expense of management would not be greater than it is now over the level; it might be slightly increased.

934. Mr. Alderman *Cubitt.*] I think you said that about half the estimate was for subsoil draining; do you consider that essential on sanitary grounds, or merely with a view to improving the land, in an agricultural point of view?—I should say partly on sanitary grounds; I conceive land subsoil drained would be more healthy than land clogged with water; but the chief benefit would be to the land itself.

935. Without subsoil draining would the other part of your scheme improve the sanitary condition of the district?—I think the main works would improve the sanitary condition of the district; omitting the subsoil draining would reduce the estimate by 5 *l.* 10 *s.* an acre.

936. For something more than half your estimate you could greatly improve the land, looking at it in a sanitary point of view?—I think the land would be greatly benefited by these works.

937. *Chairman.*] In your opinion the improvement of the land would far exceed the estimated cost?—I imagine the land would derive a benefit from subsoil drainage to a greater extent than the amount of outlay.

938. Mr. *M. Smith.*] You calculate that the actual improvement of the land will exceed the original outlay?—I can form no accurate opinion upon that subject. I should think the subsoil drainage would pay for itself; I assume that.

James Easton, Esq., called in; and Examined.

939. *Chairman.*] YOU are a Civil Engineer, and have been so for many years?—Yes; I have been in London 32 years.

940. Has your attention been called to the state of the Plumstead and Erith Marshes?—It has, for the last 10 or 12 years.

941. Have you been over those marshes several times?—Yes, and for several

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purposes; more particularly about the year 1847, relative to the regulation of the water in the level, for the cattle.

942. What is the state of the marshes at the present time?—They have been greatly improved since that time, when we lowered some of the ditches, and regulated the water supply; but the Commissioners have not power to carry out all that I then suggested.

943. You have suggested several improvements, have you not?—I have suggested improvements which would, I consider, put the land in such a state that a thorough drainage could be carried out.

944. Can you give any details with regard to those suggested improvements?—I made a report to the Commissioners in December last. The report of 1847 was not only with reference to draining, but as to the repairs of the walls, and putting them into a proper state. The steamboats going up and down the river have so much washed away the under side of the banks that the stone paving for protecting the banks is washed down more than it used to be; my investigation was with a view of seeing what it would cost to put the walls into a permanent state of repair, and for that purpose my report of 1847 was made.

945. Was your report of 1853 more with regard to the draining?—Yes. After the works that I suggested relative to the water supply in 1847 were carried out, in going over the marshes again in 1853, I found that ague had been very much less, from lowering the ditches and not having so much water in them. The ditches were lowered as far as the Commissioners had power at that time, and since then the health of the neighbourhood has been very much improved.

946. Have you given the Commissioners any plan for draining these marshes thoroughly?—I have; it is by lowering the present sluices to within a short distance of low-water mark. For instance, the Green Level Sluice could be lowered three feet (the bottom of the sluice is four feet above low water); the Great Breach Sluice, six feet two inches; the Abbey Level Sluice, three feet eighteen inches. The Old Corn Marsh was six feet six inches, and the Crab Tree was five feet six inches. In arranging this drainage, I have cut the drains as near as I could to suit the different occupiers and owners, so as not to subdivide the land belonging to any gentleman. In the intermediate fields my report suggested the filling up of as many ditches as we could. A very considerable quantity could be filled up by enlarging the fields belonging to the same owner, by throwing two or more fields into one, and not interfere either with the drinking places for the cattle or the subsoil draining.

947. Mr. *Wilkinson.*] In what way will lowering the water in the ditches improve the character of this marsh land?—It will enable the parties to thorough drain.

948. *Chairman.*] There would be outfall sufficient?—Yes.

949. Mr. *Wilkinson.*] Has the improvement which you have spoken of as having taken place resulted from any subsoil draining which has been effected?—There has been some; Mr. Russell has subsoil drained many of his fields with very good effect.

950. Sir *J. Shelley.*] Do you mean under-drained?—Yes.

951. Mr. *Wilkinson.*] It is your opinion, that if the ditches were lowered throughout the whole level, the same improvement would follow?—I believe the farmers would do it themselves within a few years; but they have not the means, because some of the ditches will not admit of it; but by lowering the ditches altogether it could be accomplished, without interfering with the drinking places for the cattle.

952. Sir *J. Shelley.*] The Committee have had evidence to show that a portion of the ditches are not under the command of the Commissioners; is that the case?—There is the difficulty.

953. Do not you conceive that to carry out any perfect system of drainage, it would be necessary that the whole of the ditches, those which are called sluices and those which are called cuts, should be under one management?—I think they ought to be.

954. What was the amount of your estimate of the expense?—I think it was about 30*s.* an acre.

955. Mr. *Wilkinson.*] Do you mean an outlay of 30*s.* an acre?—Yes.

956. Would that be for the whole system of drainage?—Not the thorough draining; but I think it would make a complete system of general drainage of the marshes, and would allow of the other being done.

957. The

957. The drainage would be effected to such an extent, that the land would be put in such a condition that every farmer could subsoil for himself?—Yes.

958. Sir *J. Shelley.*] Is not the difficulty of draining these lands the defective nature of the outfalls from the fields into the various ditches, and your scheme would remedy that evil?—Yes.

959. Mr. *M. Smith.*] I understood you to say that the main outfall goes into the river?—Yes; by lowering those, you gain an outfall in the other drains.

960. Mr. *Wilkinson.*] Has there been any alteration in the height of the river of late years, so as to account for the fact that these sluices have been made too high?—I do not know that there has been any alteration in the bed of the river. I think at the time these sluices were put in, thorough draining was not thought of, particularly in that sort of land.

961. Mr. *M. Smith.*] You say that the sluices are not low enough; you mean that they are not sunk low enough into the river?—Yes.

962. Mr. *Greene.*] If you lower the sluices very materially, will not the flood-gates to the sluices be closed a much greater time than they are at present?—That would have no effect.

963. Mr. *M. Smith.*] I presume there would be a shorter time between high and low water, to enable any superfluous water from the uplands to run away?—Yes. The only inconvenience from the sluices being very low is in case of repairs being necessary; there are sluices upon some of the lower levels very nearly level with low-water mark.

964. Do you think, as a practical man, that laying sluices upon a dead level, or with a slight inclination, or a great inclination outwards, is the best?—I should lay them as nearly level as possible, to get as great a fall as I could. The effect of a fall in that distance would not be great, it being only about 100 feet long.

965. Do not you consider 100 feet a long sluice?—Yes.

966. What is the ordinary breadth of the sea-wall at the base, where the sluice goes through?—I should think it varies from 60 to 100 feet; some may be 50. I do not know whether Mr. Rammell has discovered that in the whole of the marshes on the Kentish side there are springs of water issuing from the chalk; and there is an immense quantity in that level, quite enough to spread all over the ditches, if it is properly managed.

967. Are not those land springs?—Main springs, out of the chalk; and so they have in all the lower levels.

968. What depth are they generally under the surface?—They are running out in the ditches. There is one not far from the Abbey Wood station.

969. I suppose by a system of under-draining a person might get rid of the whole of those springs?—Those springs rise in the bottom of the ditches, as though they were ordained to feed the cattle.

970. Are there not generally springs rising in marshes although they may not come so beautifully arranged in the ditches?—There are not springs always rising in marshes. In the marshes under this Commission, there are five or six beautiful springs flowing up. From the want of greater power in the Commissioners we have had some difficulty in arranging the water all over the level, for the cattle.

971. I take it to be your opinion that the evil arises from the want of a uniform system of drainage throughout the level?—Yes.

972. Mr. *Wilkinson.*] If the Commissioners had proper powers to carry out a system of drainage, have you any doubt that the thing would be done?—None whatever.

973. *Chairman.*] Do you see any engineering difficulties?—No.

974. Mr. *Wilkinson.*] Do you think the drainage of these marshes would pay commercially?—I have not a doubt of it.

975. Sir *J. Shelley.*] You think it would pay at your estimate?—Undoubtedly.

976. Would it pay at an estimate of 14*s.* 5*d.* an acre additional rent per annum?—Not without thorough draining; the mere lowering of the sluices would not increase it so much as that, but it would give the farmers the means of thorough draining.

977. The 14*s.* 5*d.* of which the last witness spoke as the annual expense per acre included thorough subsoil drainage?—Yes.

978. Do you consider that the rental of the land would be increased in value

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equal to an annual expense of 14*s.* 5*d.* per acre for 30 years?—I should say it would be increased very materially.

979. Can you state what the rental of the land in the marshes is generally?—I cannot; it varies; including the wall scot, it is about 50*s.*; the wall scot is from 7*s.* to 8*s.*; it is worth about two guineas an acre; the wall scot is deducted.

980. *Chairman.*] Can you give any detailed estimate of your works?—I will explain how I have done it. I had the whole of the ditches measured which are in the Commission, those over which the Commissioners have control, and those over which they have not control. I have calculated the prices of lowering them at the prices which the Commissioners are generally giving, and also for the sluices at the price we have contracted for putting sluices in.

981. Sir *J. Shelley.*] In the course of your inquiry, did you find out at all the feeling of the owners and occupiers as to any extensive works being carried out?—I do not think they are favourable to a large outlay.

982. Mr. *Greene.*] In sinking your main ditches so very considerably below what they are at the present moment, have you made any calculation as to the necessity of making them very much broader than they are at the top, and of the expense of keeping up those banks?—No, the deepening would not be much, except in a few places; where the principal deepening takes place the land is low; it is near the water; there are two or three places in the marsh where the land surface is very near the water surface, and the ditches could be sunk enough to drain the land without inconvenience as to width.

983. You do not think there would be any necessity for walling to keep up the banks, or any additional expense to the proprietors of the lands in maintaining those ditches perfectly clear and in order?—None at all; we have had experience of that from the works which were executed in 1847.

984. Sir *J. Shelley.*] In lowering these ditches there would be the risk of the slipping in of the banks, unless you widened them?—We did not lower them enough for that; we lowered them as far as we could in 1847.

985. What is the subsoil into which you get?—Clay.

986. I suppose there is no wash at all?—No.

987. *Chairman.*] What is the amount of your estimate for the works you propose for the thorough drainage of these marshes?—The total estimate for the works which the Commissioners propose to carry out for the portion in the Commissioners' hands was about 1,670 *l.*, including the sluices; then, for sinking the private ditches and preparing drinking places for the cattle, I estimated the expense at 1,721 *l.*

988. Sir *J. Shelley.*] Are you aware that evidence has been given that there is no power in the Commission as to extend the outlay of money over a number of years, and that it must fall on the year in which the work is done?—I believe that is the case.

989. Do you think, as far as you have heard, that if any powers were given to the Commissioners to throw the expense over an average of years, it would be likely to facilitate the getting the consent of the owners and occupiers?—I should think it would.

990. *Chairman.*] In your opinion the whole difficulty lies in the want of power in the Commissioners?—I think it does; I am sure, according to my experience for the last 12 or 13 years, that if they had had greater powers these levels would have been in a much better state.

991. Mr. *Greene.*] With reference to the Commission itself, would you extend it beyond what it is at present, or would you limit it to a certain number of individuals, who are interested in the outlay upon the land?—I do not think it would do to choose the Commissioners generally from the farmers; in most districts you find but few farmers who would be intelligent enough for it; generally speaking, I think they are jealous of each other; they are afraid of one having more done than another. I should say that a better Commission would be chosen from the gentlemen in the neighbourhood, with probably a few of the most intelligent of the farmers.

992. Would you not limit the Commission in point of numbers, rather than extend it over a vast number of persons?—That is a point which I have not considered.

993. Sir *J. Shelley.*] When you speak of farmers, I presume you mean the occupiers

occupiers in contradistinction to the owners?—Yes, in most districts there are rising very intelligent farmers, as well as landed proprietors.

994. However intelligent a tenant farmer is, do not you think it is reasonable he should object to an outlay for which he would have entirely to pay, supposing him to leave his farm the following year, for the benefit of the landowner?—Yes.

995. Do not you think that one material reason why in all these plans for drainage there is a difficulty in getting the consent of occupiers, is the power which is given to the Commissioners of throwing the expense upon one year?—Yes, and the want of leases.

996. Is there anything unreasonable in an occupier taking care of his interest?—No.

997. Mr. *Wilkinson.*] Do you think if a system of election were adopted; if, for instance, the farmers or occupiers of these lands had the power of electing Commissioners, and the qualification of those Commissioners was to be the holding a certain amount of land, that would work well as regards the management of these marshes?—I have scarcely had experience enough in these matters to give an opinion; I have turned my attention principally to the engineering points.

998. Sir *J. Shelley.*] You consider that if your scheme were carried out there would be nothing to prevent the thorough under-drainage of the whole of the marshes?—Certainly not.

APPENDIX.

Appendix.

REPORT by a SUB-COMMITTEE of a Visitation of part of the Parish of *Charlton, Kent*, on 21 October 1853, to the Sanitary Board of that Parish.

BETWEEN the Lower Woolwich-road and the Thames river bank (artificial) the ditches are but very imperfectly cleaned, and it is stated that the sluices are very irregularly attended to, and that at the last visitation of the Wallscot Commissioners only one of the occupants of land, Mr. , had notice of such visitation, and consequently had not opportunity of making any observations in reference to the condition of the drainage.

Opposite to Sir Thomas M. Wilson's yacht dock are two adjoining cottages, built on the south edge of the bank, with areas in front, viz.:

Page (two adults, seven children). Have only rain-water to drink; privy wants emptying; no drain; slops thrown out before or behind, as most convenient.

Mounser (four adults, three children). Water, drainage, and privy as at Page's, but the privy cleaner.

Behind both these cottages is a very nasty ditch, from which the sewage has not opportunity of soaking or running away.

At the west corner of Anchor and Hope Lane is a block of five houses and Ayles's ropeyard. The former is situated on the south edge of the sewer bank, without any areas in front. Their only supply is rain-water, collected in a brick tank at the foot of the south side of the bank, black with dirt, but not stinking, and has some inches of dirt at its bottom at the present time; it is also but a few feet from a filthy, narrow, unpaved, shallow ditch, which runs along by the ropeyard fence, and is the only thing like a drain; but the filth has no means of getting away from it. The tank is cleaned out once a year by subscriptions from the five houses.

Anchor and Hope (five adults). At the west end of this house is a privy on a level with the top of the bank; but the cesspool itself runs down against the wall, which forms the side of a room, which, as in the other houses here, is the ground floor against the south side of the river bank.

Opposite Ayles's house, a new pier is in course of construction.

Anchor and Hope Lane, extending southward up to the Lower Woolwich-road, is in a very filthy, muddy, and almost impassable condition, with ditch on each side. At the upper end a beginning of draining the road by passing inch drain pipes into the ditch. The land on both sides is very wet. It is intended to build houses between this lane and the tramroad from the sand pits (south of the Woolwich-road), which will necessarily be very damp and unhealthy till some improvement in the drainage be made. On the west side at the upper end of the lane, on Mr. garden land, is an offensive heap of night-soil, close to the road. At or near this spot is the usual place for depositing such filth. On the opposite (east) side of the lane are

Fuller's Cottages. Single houses, with basement rooms below the level of the road, with brick floors soaking with water, and in the immediate neighbourhood of the spring; ditch behind them.

Snooks (four adults, two children). Privy on the edge of the bank, part of the brickwork of its cesspool exposed, and will allow the fluid filth to escape from it.

Evans (four adults, five children). Privy cleaner than the former, and its cesspool not exposed.

Above this is the yard of the corner house of the lane, the first of eight cottages, called Green Bank, which front the Lower Woowich-road, and are on its north side. Further on (eastwards), and opposite the sand pits, (the tramroad from which here crosses beneath the high road) are four cottages, separated by the tram into pairs, and known as

At the north-east corner of the easternmost cottage is a beautiful spring flowing quickly from the bottom of the bank into a ditch.

Just beyond the Charlton turnpike, close to Paradise-row, is another bright spring at the bottom of the bank, which runs into the marsh ditch separating the fields occupied by Mr. from the plot of ground between it and Harden's Manor-way, eastward. This spring

spring has been subject of dispute, has been enclosed with rails, which have been broken away, replaced, and some are now sawn out so that a person may squeeze through and get to the spring.

It is much to be regretted that this spring, and that by the tramroad, should be allowed to run to waste, as the water is very brilliant, and said to be very good, which is most probable, as it filters through the sand.

Proceeding (eastwards) towards Woolwich, on the north-side of the road are Coburg-place, consisting of four cottages, separated by West-street from Albert-place; in which are ten cottages, separated by East-street from Star-terrace; in which are five cottages, and at its east end is the chapel which forms the south-western corner of Harden's Manor-way.

All these 15 cottages are on a level with the high road, therefore stand high, and have areas and basement stories, with little gardens in front, and small yards behind on the slope of the bank.

West-street, East-street, and Harden's Manor-way drop down from the high road, scarcely at the distance of 30 yards, into the low grounds which extend northward to the river bank. The whole of this is a complete swamp, excepting the roadway in West-street, York-mews, and Cross-street, which is tolerably good; but in East-street, and its continuation, Norfolk-street and the Manor-way, it is a mass of deep mud; though this might be put to rights as the swamp is 18 or 20 inches higher than the marsh ditches.

West-street extends from the Woolwich road (northward) to York-mews. On its west side are built 20 cottages, without cellars, single, with washhouses behind, and each furnished with a privy, but all below the level of the road.

Nos. 1 to 10, inclusive, have water laid on and drain into the marsh ditch, which receives the spring from beside Coburg-place.

Nos. 11 to 20, inclusive, have not any water laid on, but are obliged to fetch it from a pump at No. ; neither are they drained, but are obliged to throw their waste water anywhere. Five of these last are unfinished, and one of the other fifteen is without a tenant.

Beyond these is an open waste, and then twelve cottages are commenced building, but have been stayed for some time. The last house on this side is the Prince of Wales public-house, separated from the cottages by a space probably left for a street. Opposite the unfinished cottages are eight cottages, all that are built on the east side of the street. The remainder of the ground up to Albert-place being open and swampy, a large pipe-drain has been laid down and shows at the upper part of the east side of the street where it is broken into; possibly it runs all the way down, but if so, is of little use. This plot is pretty equally divided, by an open, shallow, filthy ditch, about 18 inches wide, which runs from south to north, and separates the gardens of the houses in East-street from those now built, and hereafter to be built in West-street. This ditch is continually full, receives the overflowings of the cesspools of all the adjoining houses into which their drainage runs. Cuts from the open land are also made to this ditch, but it is nevertheless a filthy swamp. The space between the backs of the houses in West-street and East-street is almost 100 feet.

In East-street, on the west side, are 39 cottages, single, with washhouses, gardens, privies, and water laid on, but no drainage except into the privy cesspools, the overflowings of which run into the ditch between this and West-street. Of these cottages 16 are empty. The 13 next Woolwich-road have been recently taken by Mr. who is now repairing them and the adjoining footpath.

On the east side of the street are 31 houses, of which 13 are empty.

The whole road in this street is much higher than the floors of the houses (which have not cellars), particularly on the east side, and is full of deep mud. About the middle of the street, on each side, is a gulley-hole, but both are choked and useless.

Norfolk-place continues East-street below York-mews and Cross-street. It consists, on the west side, of six finished double houses, five of which are tenanted. They have gardens behind, with privies, but no drainage; water is laid on. At the end of the gardens of Nos. 4 and 5 are pigstyes and pigs. Other five cottages have been commenced building, but have been stopped for some time, and are floating with water; the roadway is tolerably bad, and on its east side is an open garden.

Harden's Manor-way, and its continuation, Dartmouth-place, extend from the Woolwich-road to the brickfields and George-street. The west side only of this street (Manor-way), is in Charlton.

On the top is the chapel; then follow 31 houses to Cross-street, at the north-east corner of which is the Lads of the Village public-house, and 34 more houses; beyond which, in Dartmouth-place, are 10 more, of which last the first six belong to Nichols, baker, and the other four to . These houses are mostly double, and have little gardens in front as well as behind; they have privies and water laid on. The distance between the backs of these houses and those in East-street is about 80 feet; above Cross-street there is but one empty.

Appendix.

The whole road is in a most filthy condition. On the east side the Woolwich people have laid down, from the Woolwich-road as far as opposite No. 27 of Charlton, a large pipe-drain, and at this point it runs eastward along the meadow, north of one of the marsh ditches, which, turning the corner, runs along the east side of the Manor-way, below George-street, and is wide, and very filthy. Between Cross-street and George-street the whole road is most filthy and deep with mud.

From Nos. 32 to 67 in Manor-way are double houses, and some have a little washhouse behind. These houses have water laid on, and privies, which run into a filthy ditch at the end of their back gardens, the bottom of which is two feet from the surface. One of the tenants stated that the smell was very bad, especially in the morning, and said that the people were very desirous of having a lamp, as the place was very dangerous at night. At No. 64 is a pig-stye and pig.

Turning eastward, at the bottom of Dartmouth-place, is George-street.

On the side of which are four cottages, without cellars, two only of them inhabited. On the opposite side, between the street and the river bank, is a large brickfield, extending some distance westward. At the corner, close to Dartmouth-place, is an open filthy ditch. Behind George-street are the gardens of Dartmouth-place, and of the Manor-way, up to Cross-street, and an open patch of ground, which probably at some time or other will be covered by the continuation of Norfolk-street; and a wide filthy ditch receives all the drainage from the adjoining houses. About 20 yards from George-street is a shallow bricked but open cesspool, connected with the ditch, from which a large pipe-drain runs westward, but how far is not to be seen. The ditch becomes more and more offensive and extensive as it runs southward towards Cross-street. The north side of which is entirely occupied by the yard and offices of the Lads of the Village public-house, which corners this street and the Manor-way. There is a large pool which soaks continually into the cellar of the public-house, and deposits a large quantity of filthy black mud, of which the publican complains exceedingly.

On the south side of this street are four cottages.

York-mews, opposite the west end of Cross-street, connects East-street and West-street. On the south side are eight houses, with very small fore-courts and gardens behind, like those in East-street. On the north side are 16 cottages, without any fore-court, but having gardens behind, privies, and water laid on, a stand pipe being placed between every two, but there is no drainage, consequently all the gardens are very filthy and swampy. A large pipe-drain runs westward through the open ground at the end of their gardens, which some of the tenants have either broken into or shifted the joints, so that the water may escape from their premises. Nos. 12 and 13 have pigstye and pig. The tenant of No. 14 says that the house is very damp, so much so, that although there is a continual fire, the hearthstone in one of his rooms is never dry more than one half. He says also that the water runs so into the privy cesspools, that on going in the water squashes up between the boards.

I N D E X.

[*N. B.*—In this Index the Figures following the Names of the Witnesses refer to the Questions of the Evidence; the Numerals following *Rep. p.* to the paging of the Report; and the Figures following *Ev. p.*, and *App. p.*, respectively to the paging of the Evidence, and of the Appendix.]

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REPORT

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SELECT COMMITTEE

ON

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MINUTES OF EVIDENCE,

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